THE JOURNAL

OF THE

DEPARTMENT OF AGRICULTURE

VICTORIA.

PUBLISHED FOR AND ON BEHALF OF THE GOVERNMENT BY DIRECTION OF THE

HON. GEORGE SWINBURNE, M.L.A.,
Minister for Agriculture.

VOLUME IV.
1906.

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By Authority:
J. KEMP, ACTING GOVERNMENT PRINTER, MELBOURNE.
1906.

13964.

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The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign countries. Single copy, Threepence.

Subscriptions should be forwarded to the Secretary for Agriculture, Melbourne.

THE JOURNAL

OF

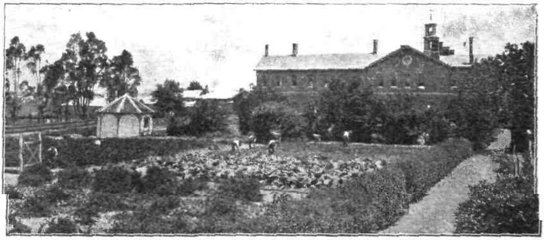
The Department of Agriculture.

Vol. IV. Part 1. 8th January, 1906.

CLOSER SETTLEMENT STUDIES.

BALLARAT DISTRICT ORPHAN ASYLUM.

A. Kenny, Superintendent.



GENERAL VIEW.

As showing what can be done with a small area of worthless land by systematic energy and perseverance, there are few better object lessons than the Ballarat District Orphan Asylum. Without the advantages of irrigation, and with the disadvantages of a cold, bleak climate, and land which is generally considered absolutely worthless for purposes of agriculture, Mr. Kenny has gradually built up a small farm which, in proportion to its size, is one of the most valuable properties in the State. The work done and the methods pursued bear so directly upon the problems which have to be faced by large numbers of settlers under the Closer Settlement Acts that a short summary of the methods and results cannot be otherwise than helpful and instructive. The work has been done by the well-directed efforts of 40 to 50 little boys; and the lessons inculcated have been so well taken to heart that these boys are well known

in many districts as well-trained farm workmen, while in not a few instances they have become prosperous farmers themselves. We allow Mr. Kenny to tell his own tale.—[ED. *Journal.*]

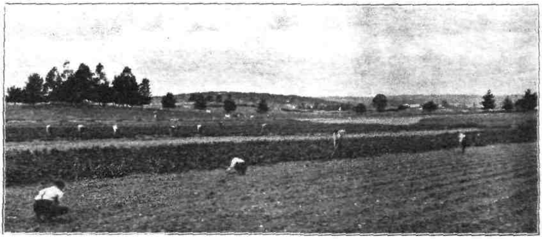
The Ballarat District Orphan Asylum grounds contain 50 acres divided into fifteen paddocks. It was all mining ground, three distinct rich alluvial leads having run through it. Consequently, it was full of holes, heaps of gravel, and all kinds of *débris* after the miners left it. The initial work was to level it, and fill in the holes. This was done systematically bit by bit, by the boys of the institution. It was a long, tedious job, lasting for about 25 years, but last year it was completed. After it had been levelled, it was found that there were some good flats with excellent soil, in some places 5 feet underneath the sludge, which had been run on top from the miners' puddlers. It was looked upon as folly to attempt to turn down the sludge and turn up the soil which had been buried. A small area was first started, and it turned out so satisfactorily, that little by little 12 acres have been done in this way, and

FLOWER GARDEN.

this land now, well trenched, is worth between £40 and £50 per acre. Very heavy crops of cabbages, potatoes, peas, &c., are grown year after year on this land, which was at one time quite worthless. There are hundreds of acres of similar land about Ballarat, which only require system and management to make it a source of wealth to the State.

After levelling and trenching, it was found that the soil was so retentive, and there was so much underground water, that draining was absolutely necessary before any good return could be had. A commencement was made with drains at half a chain apart, and from 2½ to 3 feet deep. There were plenty of quartz stones; these were all conserved for the purpose, and with plenty of little hands were picked up, and the small ones were placed in the bottom of the drains, the big ones in the centre, and a small size on top, and covered over with rushes and pine branches. This method makes excellent drains, which are as good to-day

as when put down twenty years ago. There is only one more paddock to drain, and that will be done this year. There are now 20 acres in cultivation.



CULTIVATING POTATOES.

The principal crops grown are hay (wheat and oats mixed), maize, barley, mangolds, carrots, parsnips, peas, potatoes, and pumpkins. The largest crops are hay, mangolds, and potatoes. Two crops per year are taken off most of the land. The land is heavily manured with farm-yard manure; no artificials are used. The finances of the institution will not allow any expenditure in cash that can possibly be avoided, but we hope to be able next year to buy, say, about 20 tons of lime, which it is thought will give great results. The boys of the institution collect, in every manner possible, about 1,500 loads of manure; stable manure from the city, road scrapings, &c., are all eagerly sought after. One or two grass paddocks are top-dressed every year, and this is the making of the grass land; put on in the end of May, great results are achieved.

The general rotation carried out is to manure the grass land the year previous to being broken up; plough early in March or April, and sow with wheat and oats mixed. Second year, plough early in autumn, and sow with rape or barley and tares, whichever is the most required for green fodder; it is then heavily manured and planted with potatoes and mangolds. These crops are kept thoroughly cultivated by the boys with forks about every fortnight all through the growing season, keeping the ground clean, and well working the land. Third year, the paddock is then laid down in grass for two, or at the very most, three years, sown with 1½ bushels of the best perennial rye-grass, a little cocksfoot, and 4 lbs. mixed clover. It is cut for grass hay the second year, and if it is not broken that year, heavily top-dressed. The grass hay we find excellent for the milking cows during the winter, especially when the cattle are fed with mangolds. A large quantity of mangolds are grown for winter feed, the crop running about 60 tons per acre.

The stock on the land at present consists of ten milking cows and fifteen head of young cattle, all our own rearing, two horses, and one pony. The cows are a cross between the Shorthorn and Ayrshire, which is found to be the best suited for the land. An average of 50 quarts of milk is kept up all through the year. Sufficient is separated to keep

the place in butter (30 lbs. per week being required). All the vegetables and potatoes are grown for 200 inmates, and the surplus sold. Last year the crops realized £90 7s. 9d., and a clear profit of £60 was made from pigs in addition. The value of the vegetables and potatoes supplied to the house was approximately £280.

THE DAIRY HERD.

SYNOPSIS OF THE MILK AND DAIRY SUPERVISION ACT 1905.

2. This Act shall come into operation—

(*a*) as regards the Metropolitan milk area and the milk areas of Ballarat, Bendigo, and Geelong, on the first day of July, 1906, and

(*b*) as regards any other milk area or Municipal district on such day as the Governor in Council shall fix.

3. Interpretation clause. The following are the most important:—

"Animal" means any animal of the kind to which any of the following belong, viz.:—Cow, dog, pig, horse, donkey, goat, or sheep.

"Butter-fat" means the pure fat of milk.

"Dairy" means any premises (not being a dairy farm or factory) where milk is kept for sale or where any dairy produce is prepared for sale.

"Dairy farm" means any premises where cows are milked or kept for the purpose of producing milk either for sale or for preparing any dairy produce for sale, and includes the animals thereon.

"Dairy produce" means milk, cream, butter, cheese, concentrated or condensed milk or cream, or any article derived or prepared from milk or cream.

"Factory" means any premises (not being solely a dairy farm or dairy) where cream butter cheese or any dairy produce is prepared packed canned or manufactured for sale, and includes creamery.

"Milk" includes any article purporting to be milk.

"Owner" includes occupier or person in charge, or apparently in charge, owner's agent or manager and in the case of a company the manager secretary or other controlling officer thereof.

4. Repeals the provisions of the Health Acts having reference to milk and dairy supervision to the extent to which they are inconsistent with this Act, but this Act does not repeal supersede or limit the operation of any enactments providing for the sale of food in a pure and sound state, or the prevention of the sale of adulterated or unwholesome food or drink.

5. This Act shall be administered by the Minister of Agriculture.

6. In any municipal district outside a milk area and which at the request of the Council thereof has been proclaimed as a municipal district subject to the provisions of this Act, all powers authorities and duties by this Act conferred on the Minister shall if not inconsistent with the context be exercised and executed by the Council thereof, and all necessary licences shall be issued by the said Council. The Council of such district shall subject to the approval of the Minister appoint and pay such supervisors as are necessary. Two or more such Councils may subject to the approval of the Minister appoint the same person as supervisor. No person shall be appointed by a Council or Councils as a supervisor unless he is qualified to be selected and appointed a supervisor by the Governor in Council, and when required to do so he shall forward copies of all reports to the Minister.

7. Provision for Council being superseded if the Minister is satisfied that the Act is not being carried out.

8. Provides for the appointment of officers. These include the chief veterinary inspector and the chief dairy inspector. Subject to the Minister the inspectors shall control supervise and direct the supervisors in carrying out their duties.

9. There shall be appointed by the Governor in Council such and so many supervisors as the Governor in Council shall from time to time determine.

The supervisors shall not be subject to the Public Service Acts. Each supervisor—

(*a*) shall be appointed under a specific contract with him for one year, but shall be eligible for re-appointment from time to time, and he may be at any time removed by the Governor in Council;

(*b*) shall be selected after a written and practical examination by examiners appointed by the Governor in Council. In such examination special importance shall be attached to the practical part. In lieu of the written part of the examination the Governor in Council may accept any prescribed public examination;

(*c*) shall be paid a salary at a rate of not less than One hundred and fifty pounds per annum; and

(*d*) shall have a district assigned to him annually.

10. It shall be the duty of each supervisor—

(*a*) to become personally acquainted as far as possible with every owner of a dairy farm dairy or factory and the conditions of every dairy farm dairy and factory in his district;

(*b*) to confer with or advise such owner on matters connected with his farm animals premises utensils milk and dairy produce when requested to do so or when instructed to do so by the Minister;

(*c*) to inspect and examine all premises utensils and appurtenances and also all animals and their food and water supply and also all dairy produce at such dairy farm dairy or factory in such manner and by such means as may be prescribed;

(*d*) to make such other inspection examination inquiry or investigation as may from time to time be directed by the Minister; and

(*e*) to report to the Minister the results of inspections in such form as the Minister may require or as may be prescribed.

11. The annual amount payable for a licence shall be—

(*a*) for a dairy farm such sum as may be prescribed but not exceeding sixpence per cow.

(*b*) for a dairy or factory such sum as may be prescribed but not exceeding in each case two pounds.

(*c*) for each creamery attached to a factory such sum as may be prescribed but not exceeding five shillings.

In computing the number of cows to be paid for, the fee shall be based on the highest average number of cows milked in seven consecutive days during the twelve months immediately preceding the application for the licence.

Where the provisions of this Act are administered by a Municipal Council the fees shall be fixed and collected by the said Council subject to the approval of the Minister and such fees shall be applied by such Council towards the expenses of administering this Act.

12. Within one month after the coming into force of this Act in any municipal district and thereafter in the month of June in each year the owner of a dairy farm dairy or factory shall make application for a licence and pay the fee to the municipal clerk or treasurer of such municipality or to a supervisor.

Where a licence is required for a period less than twelve months there shall be paid one-twelfth part of the annual fee for every month.

After a dairy farm dairy or factory has once been licensed, a licence shall be issued for any succeeding year until the receipt of a report from the supervisor showing to the satisfaction of the Minister that the place is not in a suitable and sanitary condition.

When a licence is refused the applicant shall have his fee refunded to him. Any owner who has applied for a licence and paid the fee therefor shall unless and until his fee is refunded to him be deemed to hold a licence.

13. The owner of a dairy farm dairy or factory shall when so requested by a supervisor furnish such assistance by information or otherwise in regard to the dairy farm dairy or factory and all receptacles appliances or machinery used in the business as may be required for effectively carrying out the provisions of this Act. Every owner of a factory shall furnish monthly returns to the Minister setting forth the number of suppliers the quantity of milk and cream purchased, the quantity of butter manufactured and the total sum paid for the same.

The owner of a dairy or factory shall when requested furnish the name and address of any person supplying dairy produce.

14. Boundaries of the Metropolitan, Ballarat, Bendigo, and Geelong milk areas.

15. On the recommendation of the Minister any portion of Victoria may be proclaimed a milk area by the Governor in Council, and the boundaries of any milk area may from time to time be altered extended or reduced by the Governor in Council.

16. There may be established and maintained by the State or by any Council in any milk area or municipal district a model dairy farm or dairy.

17. Any supervisor may prohibit for a period not exceeding two weeks the use of any cow for the production or preparation of dairy produce for sale, if such supervisor is of opinion that such dairy produce would be deleterious to health, and he may brand such cow with a brand which is not of a permanent character. The Minister or Council shall confirm or cancel or modify such prohibition, and the owner may appeal to the Minister against any such prohibition.

Where such prohibition is made permanent the cow may be ordered to be branded in such permanent manner as may be prescribed, and the Minister shall notify the owner of his decision as to such permanent branding and such decision shall be final and conclusive.

18. When a written notice is forwarded to the owner of a dairy farm setting forth that the use of a cow for production of dairy produce is prohibited, the owner shall at once prevent the use of such cow during such time or permanently (as the case may be).

19. Any supervisor may use any means which may be prescribed for the purpose of ascertaining whether any cow is affected with any disease requiring any cow to be isolated or branded under this Act or is in such a condition as to be likely to yield unwholesome milk.

Certain methods of diagnosis shall only be made by or under the direction of an officer who is a registered veterinary surgeon.

20. The following shall be notifiable diseases of animals under this Act :—

Anthrax,
Black leg or symptomatic anthrax,
Contagious mammitis,
Contagious pleuro-pneumonia,
Contagious abortion,
Swine fever,
Tuberculosis,
Variola vaccinia, and
Any disease which may from time to time be proclaimed by the Governor in Council by order.

21. When any animal is affected with any notifiable disease the owner shall immediately notify the fact in writing to a supervisor or a member of the police force and in the notice shall state—

(*a*) his name and address,

(*b*) the address of the dairy farm or dairy where such disease exists,

(*c*) the kind of animals and number of animals affected with such disease,

(*d*) the name of such disease, and

(*e*) any action that has been taken in pursuance of the provisions of this Act with regard to every such diseased animal.

The owner shall at once isolate any such animal.

The word "isolate" means the keeping of an animal in a separate enclosure in such a manner as to prevent actual contact of such animal with any cow being used for the production of milk or cream for sale or with any animal having contact with such cow.

Every registered veterinary surgeon or other person treating animals for disease upon it coming to his knowledge in the course of his practice that any animal is suffering from or is affected by any notifiable disease shall at once notify the Minister of such occurrence.

A fee of Five shillings shall be paid to the owner or veterinary surgeon for such notification if the report is correct. Only one such fee shall be paid in respect to any single outbreak of such disease.

22. When any person residing or employed at a dairy farm dairy or factory is affected with any contagious or infectious disease the owner shall immediately on such occurrence coming to his knowledge forward a written report to a supervisor or to a member of the police force.

Such owner shall immediately prevent the affected person from milking feeding attending handling or otherwise coming in contact with any cow producing milk for sale and from entering any room containing any dairy produce for sale and from touching or handling milk utensils or milk for sale at such dairy farm or dairy or factory.

23. No person (*a*) who is affected with any contagious or infectious disease, or who has within the previous twelve hours been in contact with any person so affected, or who is affected with eruptions or ulcerations or discharging wounds of the skin of the face hands or arms; or

(*b*) who has within the previous twelve hours been engaged in handling any animal or carcass affected with any notifiable disease under this Act and has not taken the prescribed precautions for disinfection; or

(*c*) who is employed in connexion with night-soil or any other substance declared to be noxious for the purposes of this section by the Governor in Council,

shall milk any cow used for the production of milk for sale or shall touch or handle milk utensils or milk for sale or shall enter a room containing milk for sale unless authorized by a written certificate from a medical practitioner or from the Minister or a supervisor.

No person shall sell any dairy produce in regard to which any person affected or employed as described in this section has in any way contravened this section or any dairy produce that has been stored in any room that has been entered in contravention thereof.

24. Subject to this Act any supervisor may at all reasonable times—

(*a*) enter inspect and examine any dairy farm dairy or factory and inspect and examine all the animals dairy produce and utensils; or

(*b*) take samples of such dairy produce or of water or fodder supplied to animals or of any materials used in connexion with the preparation of any dairy produce; or

(*c*) open at any dairy farm dairy factory or at any railway or tramway station or premises or in any vehicle any package which contains or is suspected to contain any dairy produce and take samples of the same. For such samples reasonable remuneration shall be offered.

25. If after inspection any supervisor is satisfied that—

(*a*) any dairy farm dairy or factory or vehicle is unclean; or

(*b*) any utensil machinery apparatus or work at any dairy farm dairy or factory is in an unclean or unwholesome condition; or

(*c*) any animal at a dairy farm is affected with a notifiable disease; or

(*d*) any person is affected with disease so that any dairy produce is likely to be contaminated; or

(*e*) the water used in connexion with a dairy farm dairy or factory is unwholesome,

he may by writing under his hand addressed to the owner of the dairy farm dairy factory or vehicle or to the consignor of the dairy produce as the case may be without further name or description—

(*f*) order such dairy farm dairy factory or vehicle and all such utensils machinery apparatus or works as the case may be to be forthwith cleansed disinfected and rendered wholesome to his satisfaction;

(*g*) order the supply of water to be discontinued and a supply of wholesome water to be used;

(*h*) order the removal or isolation of any person affected with disease, provided that the supervisor shall first obtain the certificate of the health officer of the district that the disease with which such person is affected is a disease or condition proclaimed under this Act;

(*i*) forbid the removal from a dairy farm dairy or factory of any dairy produce or any utensils for such time as he thinks necessary; or

(*j*) with respect to animals exercise all or any of the powers conferred upon him by this Act.

26. If any supervisor is satisfied that—

(*a*) any dairy produce inspected by him is unfit for human food; or

(*b*) is being or has been removed sold or delivered contrary to this Act.

he shall seize the same.

Any dairy produce which has been seized under this section shall be forthwith placed in a cool chamber if such is available and kept therein at as low a temperature as practicable pending the decision of any legal or other proceedings.

27. Where any dairy farm dairy or factory is newly established or where the buildings and premises are being altered or extended, such buildings and premises shall be constructed altered or extended in accordance with such requirements as may be prescribed.

So far as regards any dairy farm dairy or factory the Authority may from time to time give notice to the owner to take means for the better construction and drainage of the buildings and premises and for the proper disposal of all drainage.

In this section the words "buildings and premises" include dairy, milk room, separator room, factory, cow yards, bailing up yards, cow sheds, and milking sheds.

28. Where in pursuance of the last preceding section any expense is incurred by any tenant, such expense as between landlord and tenant shall in the absence of any agreement expressly negativing the provisions of this section be payable in the proportions following:—

(*a*) In case the interest of such tenant at the time such expense is incurred be less than for a term of five years, the whole expense shall be payable by such landlord;

(*b*) If for a term of five years and less than for a term of eight years three-quarters shall be payable by the landlord and one-fourth by the tenant;

(*c*) If for a term of eight years and less than for a term of twelve years, half shall be payable by the landlord and half by the tenant;

(*d*) If for a term of twelve years or upwards, the whole of such expense shall be payable by the tenant;

(*e*) But if the tenant whose unexpired interest is less than twelve years begins dairying without the written consent of the landlord, he shall bear the whole expense.

If any such landlord or such tenant pays more than his proper proportion of such expense he may recover the excess from his tenant or landlord

as the case may be as money paid to his use, and any tenant may set off any sum recoverable by him under this section against any rent payable to his landlord.

29. Where notice is served on tenant to improve buildings or to provide a proper yard, &c., such tenant shall inform the landlord who may effect the improvements himself if he elects to do so. Such notice must be in the prescribed form.

30. Any person who feels aggrieved by any order or decision of a supervisor under this Act other than in relation to diseases of animals may on giving to such supervisor the prescribed notice in writing of his intention so to do within seven days appeal therefrom to a court of petty sessions.

31. The Governor in Council may as regards any milk area, or as regards any municipal district on the application of the Council—

(*a*) prohibit any person keeping grazing or milking cows on any parts of such area or district; and

(*b*) determine the distance from the site of any noxious trade within which no cow shall be housed or kept and no milking be carried on; and

(*c*) prohibit any person keeping for the production of milk for sale any cow that is either habitually depastured on or has unrestricted access to any street.

This section comes into force at once for the whole of Victoria.

32. Except as herein otherwise provided, no person shall sell store or keep for sale—

(*a*) any dairy produce seized by a supervisor;

(*b*) any dairy produce which is unfit for the food of man;

(*c*) any dairy produce which has been drawn or derived from a cow that is known to or suspected by such person to be diseased or that has been isolated in pursuance of this Act;

(*d*) any dairy produce from any dairy farm on which any animal required by this Act to be isolated is not isolated;

(*e*) as milk anything which is not the normal product without addition or subtraction of the healthy udder of an animal unless it is sold or supplied on a butter-fat test;

(*f*) as milk anything which is not pure milk unless it is sold or supplied as separated milk with the full knowledge and consent of the person to whom such milk is sold or supplied;

(*g*) any butter which is or purports to be factory butter and which contains less than a prescribed percentage of butter-fat or more than a prescribed percentage of water provided that in no case shall the proportion of butter-fat be less than eighty per centum nor the proportion of water be more than fifteen per centum;

(*h*) except as prescribed, any article under the names "skimmed milk" "boiled milk" "sterilized milk" "pasteurized milk" "frozen milk" "thawed milk" "humanized milk" "condensed milk" "concentrated milk" "dried milk" "desiccated milk" "milk powder" or under any designation purporting that the same is milk or cream that has been treated in any way; or

(*i*) except as prescribed, any milk to which anything foreign has been added.

33. All milk or cream purchased by or for a factory or by or for any person for the purpose of being manufactured into butter or cheese shall

be purchased on the basis of its butter-fat contents as determined by the Babcock or some equivalent test approved by the Minister and with such other conditions as may be prescribed, and account sales of such purchase shall be rendered to the vendor and shall set forth the number of pounds of butter-fat contained in such milk or cream for which payment is being made. Any vendor of milk or cream shall have the right to have his milk or cream tested in his presence at the factory not oftener than once a week. This section shall come into operation in every part of Victoria immediately on the passing of this Act.

34. The Governor in Council may make regulations which may vary in their application according to time and place for carrying out all the provisions of this Act.

35. Simplification of proof in certain cases of legal proceedings.

36. In the event of any cows being isolated by a supervisor so as to prevent the supply or sale of milk from such cows the owner shall be indemnified from the payment of any damages claimed for breach of contract so far as such cows are concerned.

37. On receiving satisfactory security the Minister is authorized out of any moneys available for the purpose to advance a sum not exceeding Twenty Pounds to be expended on the better construction and drainage of buildings.

Every such advance shall be repaid in equal yearly or half-yearly instalments, and shall be wholly repaid within a period of five years and shall bear interest at the rate of Four and a half pounds per cent.

38. Notice of seizure of dairy produce to be sent at once to owner or consignor.

39. Portion of sample of produce, &c., seized to be sent to consignor or consignee.

40. Power of officers to prosecute for offences against this Act.

41. Liability of occupier or agent in case the owner cannot be found.

42. Service of notices.

43. Continued operation of orders and notices on subsequent owners to the same extent as if they had been served originally.

44. Every person shall be guilty of an offence against this Act who—

(*a*) furnishes any certificate report or account sales which is not to the best of his knowledge and belief true and correct in all particulars; or

(*b*) replies falsely to any officer in reply to inquiries or refuses to render assistance required of him under this Act; or

(*c*) removes from a dairy farm any animal for the purpose of preventing examination of such animal or who fails to produce or submit for examination as required by this Act any animal intended for the production of any dairy produce for sale; or

(*d*) without permission of an inspector or supervisor removes from any dairy farm any animal that is required under this Act to be isolated or that is branded in pursuance of this Act; or

(*e*) in constructing altering or extending buildings or premises at any dairy farm dairy or factory fails after notice to comply with any regulation; or

(*f*) fails to comply with any notice or order made pursuant to this Act by the Minister or any inspector supervisor or officer; or

(*g*) does not hold a licence although required by this Act to hold a licence; or

(*h*) is guilty of a contravention of any of the provisions of this Act or of any Order in Council or regulation thereunder for which a penalty is not expressly provided.

Every person who is guilty of an offence against this Act shall be liable to a penalty not exceeding five pounds for a first offence and not exceeding fifty pounds for any subsequent offence.

45. Onus of proof that any dairy produce was not for sale shall be on the defendant.

46. Where the owner of a dairy farm dairy or factory is charged with an offence against any of the provisions of this Act he shall be entitled to have any other person whom he charges as the actual offender brought before the Court at the hearing of the charge; and if after the commission of the offence has been proved the employer proves to the satisfaction of the Court—

(*a*) That he had used due diligence to enforce the execution of this Act; and

(*b*) that the said other person had committed the offence in question without his knowledge, consent or connivance the said other person shall be summarily convicted of such offence and the said owner shall be exempt from any penalty. The person so convicted shall in the discretion of the Court be also liable to pay and costs incidental to the proceedings.

Where it is made to appear to the satisfaction of the inspector supervisor or other officer or any member of the police force at the time of discovering an offence—

(*a*) that the owner has used all due diligence to enforce the execution of this Act; and

(*b*) by what person the offence has been committed; and

(*c*) that it has been committed without the knowledge consent or connivance of the said owner and in contravention of his orders—

the said inspector supervisor or officer or member of the police force shall proceed against the person whom he believed to be the actual offender without first proceeding against the said owner.

POULTRY HINTS FOR SUMMER.

H. V. Hawkins, Poultry Expert and Lecturer.

Probably there is no more trying time for poultry than the present, especially so when the thermometer reaches 100 degrees in the shade. It must be apparent to all intelligent farmers that live stock must have shade, and none more so than poultry. In my travels through the Goulburn Valley last month, I have been struck with the way birds are penned. They, have simply a wire fence 6 feet high, and a house for shelter. This can, and should, be easily remedied.

SHADE AN ABSOLUTE NECESSITY.

While young shelter trees (tree lucerne) are growing, it is a good plan to cut a few branches from trees, and make what may be termed a rough mia-mia in the centre of the yard. When the leaves have dried and

fallen, run over the top of the branches a piece of common hessian, and tie it in at least a dozen places. This will afford a ready shade during the hot weather. The mistake many make is in permitting their birds to shelter in the poultry house. The less they are there the better, otherwise vermin will largely increase, and it will be difficult to cope with the pest. By constantly scratching up the floor for dusting, they ruin the floor of the house. As a matter of fact, fowls dislike remaining in their night quarters during the day, if other shade is obtainable. The want of shade during the hot weather, is the cause of many deaths. The temperature of a fowl's body is much greater than that of the poultry farmer himself. It should, therefore, appeal to him more often than it does. They, who are fond of poultry, are the only successful raisers, nothing being too much trouble when the necessity arises.

HEAT APOPLEXY.

Primary Causes.—I was informed at Katamatite lately that many hundreds of birds died during the spell of hot weather last summer. The yards which suffered most lacked the necessary shade, and death was due to heat apoplexy. The birds were attacked with a sudden fit of giddiness, and after running round, fell backwards with head twisted.

Prevention.—When the heat is 90 degrees Fahr. in shade and upwards, keep the water cool by placing receptacle in shady spot, changing three times daily, and add a packet of Epsom salts once a week to a gallon of water.

SUMMER FEEDING.

Feed only on soft, easily-digested food, and vary same. Instead of two parts pollard and one part bran each day, alternate to one part pea-meal (rich in sulphur), with one part barley-meal, and a small portion only of bran. Pea-meal by itself is too opening, and is an absolute danger; but, with a corrective such as barley-meal (binding), it makes a splendid change, and does the fowls a deal of good.

Vegetables and Lucerne are most important at this time. Twenty to 25 per cent. of the food should consist of either cabbage, lettuce, onion tops, or lucerne chaffed and mixed with meal.

Avoid the Use of Much Grain.—Avoid maize entirely, it being by far too heating as well as fattening. Animal food also must be reduced. It will never pay to force the hen to lay many eggs at this period. It is as well to reduce their condition prior to the moult, when they will require more food, and that rich in albuminoids. They are, in rather poor condition, better able to go into the moult, when the added daily ration is necessary for the new feather. They will then gradually gain in condition. It must be always remembered that fat hens are poor layers, and what eggs they do lay are very often infertile, the few chicks hatched being poor and difficult of rearing. In feeding the mash (crumbly) to, say, 50 birds, add a half cup of sulphur once a week. This will purify and keep the blood cool. There will then need be little fear of heat apoplexy.

Condiments of all kinds should, on no account, form any part of the ration. Most spices are largely cayenne, salt, &c., which create a thirst. The result is they are scoured. Very many fowls die of this complaint.

TONIC IN WATER.

Put 2 ozs. of sulphate of iron and 85 to 90 drops sulphuric acid (drop carefully) in a small bucket of water. Stir well, and give without further diluting.

DUST BATH.

The need of a cool dust bath is of great importance. Therefore, keep the dust box shaded and constantly damp. Don't be afraid to use the sprinkler, or water can. During last summer this was carried out in my own pens regularly. The birds could be seen lying breast down, with their wings spread out, and they were not in the least affected by the heat, which, for days, ran over the century in the shade. The additional trouble was more than compensated for by the healthy nature of the birds.

VERMIN UNDER PERCHES.

Remove perches once a week, and paint with kerosene, or pour scalding water over them. Syringe well the house with a strong solution of Little's Phenyle, one part to fifty soap suds. A little kerosene may be added to same.

VALUABLE STUD STOCK.

These should, at this time of the year, receive special attention. Purchase a tin of Insectibane, and, with a rubber spray pump, blow it in close to the skin. This will rid the birds of the fowl flea, which is a great drain on them.

Male birds should now be kept by themselves away from the hens, until the breeding season commences in June next, when, providing they are not too old, they should again be mated with the hens you wish to breed from.

Allow the hens a fair amount of liberty. It will better enable them to throw off any surplus fat, and will also start them to moult earlier than would be the case if penned up. As the eggs are infertile, they keep twice the length of time that the fertile ones do.

PORTABLE PENS.

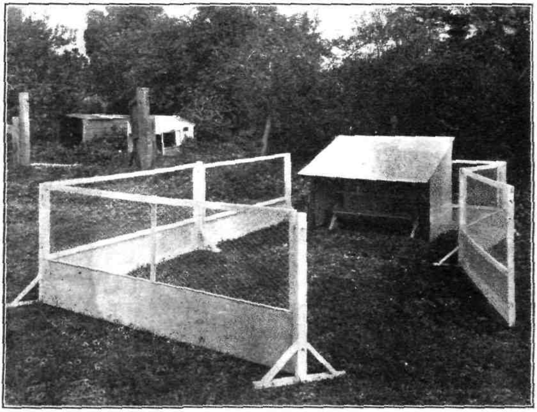
H. V. Hawkins, Poultry Expert and Lecturer.

Portable pens, as exhibited by the Department of Agriculture, at the recent Royal Agricultural Show, under my supervision, should be more often adopted. After the farmers have finished cropping, there is always abundance of insect life and fallen grain on the land, and with a few portable runs, with or without wheels, large numbers of birds may from time to time be kept moving, scratching, and manuring at the same time, feeding themselves at the small cost of labour that it entails, also bringing in a fair return.

When I think of the numberless corn-fields in this State, and of the many thousand tons of grain that were shed in those fields at harvest

time, and a few months later buried below the surface by the farmer's plough, I consider how many tons of poultry could have been raised on this corn in the past twenty years.

The more new ground fowls can run on the more they scratch for insect life, and most certainly will they assist in ridding the land of wild oats and many troublesome insect pests, which often cause serious loss to the farmers. The illustrations show clearly how to construct houses and movable pens. There is really no necessity to make them 6 feet high, 4 feet will answer, providing light frames are placed across the top;



PORTABLE POULTRY PEN.

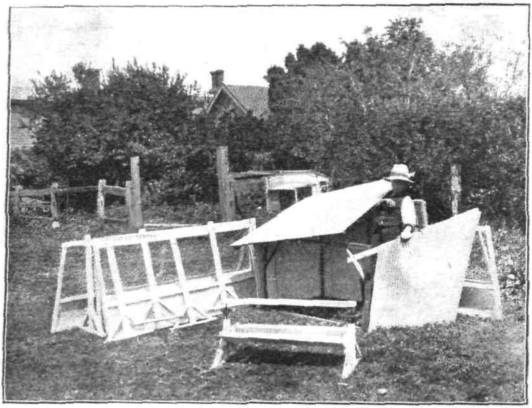
1½-in. mesh is sufficient to prevent the birds flying out or foxes and the like getting in. The size of these runs does not require to be larger than 24 x 16 feet for twenty birds, providing always they are moved at least once a day; twenty birds kept in such pens will turn over practically every sod, and add fertilizer at the same time. The accompanying plate demonstrates the ease by which the house and hurdles may be taken to pieces. The perch is also portable, and is shown in the foreground, with dropping board, which is 18 inches wide, and is suspended by hooks immediately under perch.

Scattered Field System.

Another good plan is to build portable houses, with strong wire doors, sufficient to accommodate twenty adult birds. When the chicks are old enough to leave the brooder-house, or prior to their leaving the mother hen, place a brood in the field-house, confining them there for a few days to accustom them to their new quarters, and feed twice daily until giving them their freedom. Then, each morning, they should be let out and fed

very sparingly; they will get to know you, and answer your call, after which they will find their own food during the rest of the day.

Mr. Grant, of Pakenham, has adopted this plan with great success. Scattered all over his large orchard may be seen neat white houses, all of the same design, and in each a small flock. Strange as it may seem, few birds venture to leave their own quarters. Mr. Grant informed me that no less than 600 youngsters were reared in this way. The ground is kept scarified all the year, and the birds delight to follow the machine, picking up insects, which are so destructive to fruit trees. The fowls keep down the codlin-moth, and, to use the owner's words, "The orchard feeds the fowls, and the fowls feed the orchard."



PORTABLE POULTRY PEN, SHOWING SECTIONS.

Wheat-growers of the north, with a little outlay, could keep 1,000 birds at small cost. When harvesting operations are over, tons of grain are lost, and insects abound, which the birds could secure and thrive on. In England and America many farmers have adopted this scattered-field system, and make £100 to £250 a year from their poultry. All that is required is an enthusiast to take charge, and this, to my mind, is the key to success. It is useless to pay a man to look after fowls if he dislikes them. They require an intelligent and thoughtful caretaker. Northern farmers have grand opportunities to add to their incomes, for if crops are at times partial failures, the fowls will always augment their turnover. There is no finer climate in the world for poultry raising than this. When will the farmers realize it? Are they too well off, or do they lack enterprise? In conclusion, let me urge them to go in largely for Leghorns, 500 of which, by careful selection and breeding, bring in a profit of over £150 per annum for eggs alone. In some parts of the Mallee, this has been, and is still being, accomplished.

DISEASES OF FARM ANIMALS.

S. S. Cameron, M.R.C.V.S.

I.—HEALTH AND DISEASE.

STANDARD OF HEALTH.

It is by no means an easy matter to define the difference between health and disease. Broadly speaking, it is impossible to indicate the dividing line, and say "On this side lies the normal, and on that the abnormal"; for it is scientifically true that what may be a normal condition, or condition of health, under certain circumstances becomes a condition of disease under other circumstances, and, further, it is true that disease may be a normal condition under the circumstances prevailing. What may be normal under some conditions and at some times, will under other conditions and at other times, or if maintained for an inordinate length of time, constitute disease. For instance, if a horse gallops a few furlongs at high speed, his breathing becomes rapid and his pulse increased in frequency for a time. Both these conditions are the natural and physiological result of the exercise. Without the prior exercise, however, rapid breathing and frequent pulse would be abnormal, and would be indicative of some, perhaps, serious condition amounting to disease. Again, when a horse, not in good condition or high muscular training, is smartly galloped a longer distance, his urine shortly afterwards is found to be thick and high-colored, and to contain an excess of a substance called urea. This state of the urine after unusual exercise is perfectly normal, but if it continued for any length of time, or if it existed apart from the unwonted exercise, then it would be a result of disease. On the other hand, and keeping to the same illustration, the breathing, pulse, or proportion of solids in the urine may be decreased to a normal minimum as is the case during sleep; but if that decrease to a low level remains constant, then a condition of disease exists. So that it may be accepted as an axiom that "the maintenance or continuance of a physiological or normal maximum or minimum constitutes a condition of disease." In other words, to constitute disease the modification of function must not be merely a passing alteration, but must be continuous.

So far, the references have been to illustrations of functional changes constituting disease. The same holds good of diseases due to changes of structure, a growth of tissue which, under some conditions, would be essentially natural and advantageous, may, under other conditions, be morbid and injurious. A simple example may serve to illustrate what is meant. Excessive growth of horny cuticle on a blacksmith's palm is not pathological, but is protective and advantageous, and is a natural result of the conditions to which the surface tissue of the skin has been subject; whereas, a similar excessive growth of cuticle taking the form of a corn or wart or epithelial tumour, is essentially a disease product. As another example may be taken the enlargement and engorgement with blood of a cow's udder, which, when occurring about the time of calving, is perfectly natural, but which, if it persisted, or if it existed in a heifer or dry cow, would constitute disease.

The pendulum of health, then, may be said to swing within certain limits, the conditions of life between which limits constitute a *standard of health*. Any stretching of the functions, or any variation of the structure, of any part of the body beyond such limits, constitutes *disease*, which has been defined as "a deviation from the standard of health in any of the functions or component materials of the body."

SYMPTOMS AND DIAGNOSIS.

When a deviation from the standard of health results in changes which can be observed (shivering, for example), or can be detected by the senses (touch, indicating surface heat or cold), or by adventitious aids (thermometer, showing increase of body temperature), such observed changes are called *symptoms*, or signs of disease. Diseases are differentiated from each other, or *diagnosed*, by reason of the fact that different diseases present groups of symptoms, some of which differ from those presented in other diseases. Symptoms which are definitely characteristic of a certain disease are termed *diagnostic symptoms*, as distinguished from symptoms which may be common to two or more diseases. For example, in pneumonia and pleurisy many of the symptoms exhibited are common to both diseases, and to other diseases as well; but the fact that in the former the patient seldom or never lies down, while in the latter he frequently, in the earlier stages, lies down, rolls, and exhibits pain, and the further fact that the breathing in pneumonia, although increased, is less labored and distressed than the short, tifting, painful, and abdominal breathing of pleurisy—these would serve to distinguish between the two diseases, and enable a diagnosis to be made. *Prognostic symptoms* are those by which the probable result of disease may be determined. During the progress of a dropsical disease, for instance, if a mild diarrhœa sets in it is indicative of the commencing absorption and elimination of the fluid, and is interpreted as a "good sign" —one by which recovery may be forecasted or *prognosed*. Similarly, a sudden and marked fall of temperature, following on a condition of high fever, is a symptom prognostic of impending collapse and death.

Symptoms are *general* or *local*, according as their manifestation affects the system as a whole, or is confined to a special part. Shivering fits, rise of internal temperature, and the all-round stiffness of gait in acute rheumatism are general symptoms, while the swelling of a hind limb in lymphangitis, the abscess formation in strangles, and lameness (usually) are examples of local symptoms.

It is advantageous to understand a further classification of symptoms into premonitory, primary, and secondary. *Premonitory symptoms* are those which precede the full development of a disease, and they may be common to different diseases. Increase of pulse, temperature, and respiration are premonitory symptoms of many diseases. They usually indicate disease of an inflammatory character, but, of themselves, they throw no light on the actual seat of the inflammation. Symptoms which arise directly as a result of disease, as, for example, the pain and swelling observable as the result of a bruise, are called *primary symptoms*, while the lameness which might ultimately follow as a result of the swelling, or the symptoms of blood poisoning which might arise from the absorption of septic matter from the bruise, would be *secondary symptoms;* that is, they would depend, not directly on the original bruise, but on a further development of conditions resulting from the primary effect of the bruise.

Where animals are concerned, the recognition and interpretation of symptoms of disease present many difficulties with which the practitioner of human medicine is not faced, and entail an almost entire dependence on the observational faculties of the veterinary student. The existence of pain, for instance, can only be known by observation of the attitude, expression, and action of the dumb patient, and the seat of pain by the evidences of the avoidance of movement of the affected part. Such evidences are frequently of the slightest, and require extraordinary care, quickness of observation, concentration of thought, and sound reasoning for their perception. There is, however, with animals the compensatory advantage that the evidences are mostly honest, and afford data from which reliable inferences can be drawn. In the manifestation of disease, animals are incapable of lying to their attendants, even though at times amongst horses a cunning old stager is met with who will "gammon lame" on occasion in a manner which cannot but compel admiration of his histrionic ability.

CHARACTERISTICS OF HEALTH.

In the differentiation of symptoms which is necessary for the diagnosis of disease in animals, the exercise of the faculty of observation will be found of little value without a correspondingly good knowledge of the signs of health and acquaintance with the habits of animals under natural conditions. Especially is the latter necessary in field investigation of disease, in the inspection of mobs of cattle for contagious disease, and in the examination of half-wild, unbroken, or unmanageable beasts, when the use of such implements of trade as the stethoscope, thermometer, and opthalmoscope is out of the question.

Although, by constant association with animals, most stockmen acquire an instinctive comprehension of the normal or healthy features of the domestic animals, to the tyro and student the subjoined signs and habits of health in cattle prove useful. (The signs and habits of health in horses were given in an article by the author on "Health Factors in Horse Management." See *Journal* for December, 1905.)

Signs and Habits of Health in Cattle.

ATTITUDE.—*Stands* firmly, with weight equally disposed on all four limbs. A cow in health never "stands at ease" or knuckles at the fetlock either before or behind. Generally engaged in either feeding or ruminating (chewing the cud). *Rests* by lying down with weight on the breast bone in a half-upright position; never lies flat on side. *Rises* hindquarters first; usually stretches on rising.

APPETITE.—As in horse.

CHEWING THE CUD (Rumination).—Performed deliberately and lazily, with head protruded. When the bolus of food is regurgitated into the mouth, it is placed between the teeth and the cheek on one side by one movement of the jaws and tongue towards that side. The subsequent "cuts" or movements of the jaws until the bolus is swallowed are all in the opposite direction, and usually number about 40.

COAT.—Greasy to the touch; glossy, sleek, and flat in summer, full and somewhat rough and long in winter; easily shed when rubbed during approach of spring; "lick marks" on back, loins, ribs, quarters, and thighs indicate thriving condition and contentment.

SKIN.—Supple and loose; moderately scurfy; white, not pigmented, in most breeds.

EARS.—Mobile and powerful.

EYES.—As in horse, but larger and more prominent.

MUZZLE AND NOSTRILS.—Moist and cold; dotted over with distinct drops of moisture or "dew."

TEETH.—Incisors loose in lower jaw, molars with level grinding surfaces; free from points and jags.

VISIBLE MUCUS MEMBRANES.—As in horse.

HOOFS.—Smooth and polished, free from rings, cracks, or unevenness of growth.

UDDER.—Quarters even (bilateral symmetry); uniformly soft to the touch, and flow of milk easy and uniform from each teat.

DEJECTA (Dung).—*Quantity:* From 75 to 85 lbs. in the twenty-four hours. *Appearance:* Soft and pultaceous except when on hard feed, when they may be "formed," and somewhat dry and coherent; colour varying with colour of food. Cattle seldom masticate or digest whole grains of cereals, and when these are contained in the food they usually appear unaltered in the dung, except for being swollen and slighted bleached.

URINE.—*Quantity:* Average 20 to 22 lbs. daily, a good quantity (about 3 quarts) voided at a time. *Appearance:* Pale sherry colour, without fœtid odour or excess of sediment, slime, or blood tinge. Specific gravity, 1030 to 1040.

TEMPERATURE.—*Internal:* At vagina, varies from 100 degrees F. to 102 degrees F.; average, 101.5, and should not exceed 102.5. *External:* Equable warmth of ears, horns, skin, and extremities.

PULSE.—Frequency of the pulse is very variable and unreliable. From 35 to 80 per minute; average, 45. A healthy pulse should be full and soft to the touch.

BREATHING.—Should be both abdominal and thoracic, and number eight to twelve beats per minute. In some diseases the breathing may be wholly abdominal or wholly thoracic.

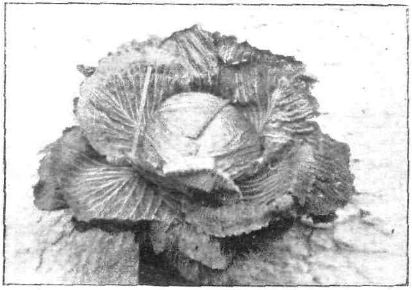
RAPE CROPS AT DOOKIE.

H. Pye, Principal, Dookie Agricultural College.

Every day the very important question of producing winter fodder for stock is becoming more essential for economical farming. There is little doubt that a thorough grasp of the question by farmers in general will make it possible to produce a wider range of products, and thus enhance the value of the smaller farms. There seems to be a limited number of plants suitable for winter fodder for stock in the northern parts of Victoria, but the cereals, if put in early and grazed, are perhaps more hardy and suitable than any of the imported grasses. Towards spring the harrows can be put over the field, after the sheep or cattle have been taken out, and the crop allowed to come away for grain or hay.

PLANTS RELATED TO RAPE.

Belonging to the same botanical family as rape are cabbages of all kinds, kale and kohl rabi. A farmer, having a small paddock of rich land, can, if the season permits, grow an enormous crop of cabbages. In some places it is a general practice to grow field cabbages for milch cows, but they must not be grown out of season, as they will flavour the milk. Heavily manured crops of these cabbages give yields of over 60 tons to the acre, but at Dookie the best crop on a small area was not one-third of such yields. The early Drumhead, and in the main early varieties, suit the climate better than late varieties. However, by utilizing different varieties, a succession of fodder may be obtained that will last well into the spring.



DRUMHEAD CABBAGE, WEIGHING 25 LBS.

Kohl rabi is sometimes called the turnip-rooted cabbage. It has not been grown much in Victoria. With us it has not been as successful as rape and kale.

The Thousand-headed Kale is no doubt a very fine fodder plant. It has been grown here at different times for the last eighteen years, but not on a wide scale, as rape seed was much cheaper, and the labour attached to the growing of it less. The seed is rarely sown broadcast, but in drills, the plants being singled out to give them space. The land is kept cultivated between the rows. Exceedingly heavy crops, grown under favorable conditions, are superior to rape. It lasts much longer into the spring before running to seed, and is perhap better relished by sheep. Kale, cabbages, and kohl rabi are frequently transplanted out from early plants grown in seed beds. A pound of seed, under such conditions, would be sufficient for an acre, if planted out in rows, 30 inches apart or thereabouts, and up to 2 feet between the plants. The cost of putting in the crop is increased by this method, hence it is cheaper to sow by the drilling machine, and use more seed. However, when the autumn is dry, a seed bed may be kept watered, and the plants given a good start if planted out as soon as the rain does come.

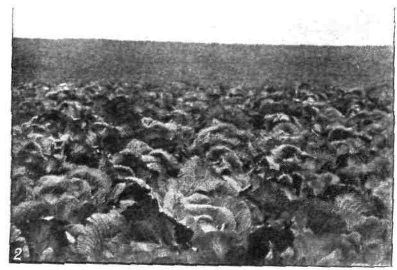
Cultivation of Rape.

This crop has scarcely had a fair trial in most of the northern districts. It has been tried at Dookie College for many years, and during the last decade or more, some magnificent crops have been grown, and some very poor ones.

The variety grown for fodder production is commonly called the Broad-leaved Essex. It is the best of seventeen varieties tried at the College, owing to the abundance of succulent foliage it produces when grown under suitable conditions. The seed is dark, the immature seed being reddish. There are varieties of Indian rape that have yellow seed, but the Indian varieties are grown for their oil-producing seeds. The oil extracted from rape seed is commonly known as colza oil. For this purpose it is not grown in Victoria, but simply as a forage plant.

PREPARATION OF THE SOIL.

Soil for rape should be deep, and as rich as possible. The land should be well ploughed, and as deep as the nature of the soil will



CABBAGE PLOT (40 TONS PER ACRE).

permit, as the plant is deep-rooted. The soil should be well worked until a fine tilth is obtained, or as fine a tilth as the nature of the soil will allow without "running" when the weather is wet. The more even and firm the seed bed the more regular will be the germination, and the better the crop.

SUITABLE SOILS AND FERTILIZERS.

Rape is a greedy feeder, and naturally it follows that the soil selected for growing a good crop should be rich in available plant food. Under such conditions returns of between twenty and thirty tons per acre of fodder are not uncommon, provided the season be favorable. It is seldom that on the generality of farms the land is naturally very rich, hence to get the best returns fertilizers should be applied. It likes a soil in which there is plenty of humus or organic matter, and for most soils, farmyard manure gives the most satisfactory returns, especially when supplemented with a dressing of superphosphate. In the northern parts of Victoria farmyard manure is not made in sufficient quantities,

hence commercial fertilizers are more commonly used for enriching the soil. Light sandy soils do not suit rape, but any nice loam, the deeper the better, will grow a crop of it. Good strong soils suit it, but heavy clays are not so good. In most instances, rape seems to be grown as a catch crop, and there is no doubt that after a barley or other cereal crop, if the land be disced and sown with rape, a nice serviceable crop of mixed fodder is frequently obtained, provided the rains fall early in the autumn. There is, however, more success in a properly-prepared field.

From the results of the experiments carried out during 1905, the crop of rape fertilized with the complete manure, that is, one containing superphosphate, sulphate of ammonia, and either potash chloride or potash sulphate, was the best, followed by those plots treated with superphosphate alone. The individual plots fertilized with the nitrogenous and potassic fertilizers respectively, were not much better than the unmanured plots that were not cultivated, but where all plots were cultivated the crop was more responsive. The difference between the manured plots, when harrowed, and the unmanured plots, also harrowed, was considerably greater, to the advantage of the manured plots. It was clearly demonstrated that not only did the harrowing improve the unmanured crop, but it encouraged the fertilizers applied to give proportionately much better results than if the land was not harrowed. The field of rape referred to above was well ploughed and worked. It was then sown down with rape, the grass-seed sower of an ordinary grain drill being used for the purpose. The plots ran the whole length of the field. The light harrows were passed over half the field when the plants were about three or four inches high, crossing the plots at right angles. A good many plants were pulled out, but there were sufficient left. The season was not a good one for rape, and there was relatively not much difference between the manured and the unmanured crops, except the halves that were harrowed. The cultivation enhanced the value of the fertilizers considerably. The limed plot gave a fairly good return, for, owing to the wet winter, the soil had become water-logged and sour.

THE ADVANTAGES OF FALLOWING.

The crop of rape on the fallowed land showed the most pronounced results. The unmanured plots were better, or as good as the best of the plots on the unfallowed land; but where the fallowed land was manured, the crop was much better than similarly treated land unmanured. It seems, from these and past experiments, that in order to get the best results in the drier parts of the State, and to have the rape ready in winter, when it is most needed, more effort should be made to force the growth. This can be done by fallowing a piece of the land, manuring it well, and sowing the seed as early as possible, say about March, or the beginning of April. When the crop is not ready until spring, in most instances the object in growing it has not been attained, as there is an abundance of grass usually available. On the other hand, very great benefits are derived from it when the rape crop is ready for May, June, July, or August. It produces a fine flow of milk in ewes and cows, and is remarkably fattening. Though cows are not usually pastured on rape, still they may be as long as judgment is used. Even the calves appeared to thrive on it, though they were not on it all day, whilst the horses had a free run on it at times, and seemed to like it.

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THE RATE OF SEEDING.

From the results of the experiments where the seed was sown by the drill and allowed to fall broadcast, the spouts being taken off, 4 lbs. of seed to the acre was ample. Above that amount the plants were too thick. Three pounds of seed to the acre was almost enough on plots where the harrows were not subsequently used, but where they were, the seeding was too thin. The seed was good, and germinated well. When sown up to 6 lbs. to the acre, the plants were much too close, and grew spindly. If the seeds be sown in drills 30 inches apart, of course it will take comparatively little seed, viz., from 1½ to 2 lbs. per acre. If too thick, a light harrowing across the drills will thin out the plants, and give a cheap cultivation also. Any cultivations between the drills would keep the land free from weeds, and stimulate the growth of the crop. When sown thinly, the plants are larger and coarser, and perhaps the medium-sized plants, due to a thicker seeding, are relished better by sheep, which first eat the sweet central shoots.

Mustard seed is frequently sown with rape. It is earlier to germinate and to mature than the latter, and has a stimulating effect on the sheep's stomachs. From ½ to 1 lb. of mustard seed to the acre is sufficient to mix with the rape seed. The yellow seeds of the white mustard assist in determining where the seed is sown, when using a Cahoun broadcast sower.

WHEN TO GROW RAPE FOR FODDER.

Undoubtedly the best time to grow rape in the Northern districts is in the early autumn. The seed should be sown ready for the first good rains of the new year. These sometimes fall during February, but not often. Spring-sown rape is an uncertain crop in the northern parts of the State, though it may be grown with success in the moister districts during the early part of spring. Sometimes a rape crop, sown in spring, in the dry districts, struggles through the summer, and comes away well in March, but the aphis is too troublesome, and attacks it then. When the land is very rich, sometimes a good spring-grown rape crop is seen, but towards the end of November, unless the season be exceptionally favorable, there is a great loss of palatableness, and the sulphur oils give a strong flavour to the mutton and milk respectively from the sheep and cows fed on it. Rape is not a summer crop, and, like most unseasonable crops, is not satisfactory when grown late.

HILLSIDES FOR RAPE-GROWING.

Hillsides sloping towards the east and north-east have proved to be very good aspects for the growing of rape on the College farm. The soil, though of medium to poor quality, is well drained, warm, and not so subject to frosts as the lower and richer lands. On most occasions the rape grown on the hillsides has been much earlier, and much better than that grown on the flats. On the hill it grew in winter, and kept growing, and on one occasion, when the seed was sown a month later than on the flat, the crop readily overtook the latter. Rape will not thrive where the drainage is bad. There it quickly assumes a reddish tinge, especially during frosty weather. On the poor hillsides it is necessary to give a good dressing of manure. If you want the crop early it must be forced, and 2 cwts. of superphosphate to the acre are not too much. If a dressing of farm-yard manure be also applied, the results

are much better; failing that, potassic and nitrogenous fertilizers are beneficial in conjunction with the superphosphate, but individually the application of these have not been satisfactory here. For a general cleaning crop, 2 to 3 cwts. of fertilizer per acre are very seldom used in Victoria, dressings from ½ to 1 cwt. being more general, if a fertilizer be used at all. Under such circumstances a fresh field is advisable each year rape is sown, since rape does not respond so well when grown frequently in the same field, or at short intervals between each crop. The best results are almost invariably obtained from the plots with the heaviest dressings of fertilizers, provided the soil is properly worked, and the drainage is suitable. One great advantage of growing rape on well-drained slopes is, that the sheep may be put on it at almost any time, whereas the land may be too wet on the flats.

Rape for Fodder.

The sheep turned on the experimental area ate the rape growing on the fallowed land first, including that on both the manured and unmanured plots. Then the harrowed portions of the plot were given attention to, the sweet central parts of the plants being eaten first. The plants tinged with red from poor growth remained untouched as long as any of the better-grown plants were available. The plants with the

RAPE, 18½ TONS PER ACRE.

reddish-tinged outer leaves were general over the parts not harrowed, both in the plots manured and unmanured. There were fewer of them on the plots to which a complete manure was applied. The palatability of rape depends mostly on the rate of growth, and this latter depends on the climatic conditions, the mechanical condition of the soil due to cultivation, and its fertility. Rape, for fodder purposes, is not so palatable when grown during warm weather with dry spells. It is then tough and rank tasted, but if grown rapidly when the temperature is lower, the plants are sweet and succulent, and otherwise appetizing. Under these

conditions it may be fed to milch cows. This season the milch cows at the College were pastured for a time on rape without tainting the butter, for which top prices in the open market were received, equal to those obtained for the best Western District brands. The rape grown on the plots fertilized with a complete manure was better coloured, and, according to my judgment, better flavoured than that grown in the other plots, except where the ground was fallowed. The fallowed ground produced the mildest flavour. Sheep appear to have a good deal of discrimination, and it was noticeable that in one small paddock they would leave certain small patches until forced to eat it. These patches were those where some fresh farm-yard manure was applied. Towards the end of spring, and the beginning of summer, rape sown in the autumn has a stronger flavour, and this is very marked in mutton from sheep fed on it. There is a field for interesting experiment open to plant breeders in developing the fattening and flesh-forming qualities of rape and other fodder plants, just as sugar-beet and sorghum growers, with the aid of the chemist, have developed the sugar-producing qualities of these plants, making it, especially in regard to sugar-beet, possible to grow this crop on a large commercial scale for the production of sugar in countries where sugar cane will not succeed.

RAPE FOR POULTRY AND PIGS.

Rape is one of the best plants for sweetening the poultry run. If the run be ploughed, or dug up during autumn, and the soil well worked, a very fine lot of rape may be grown, especially with the aid of an application of superphosphate along with the poultry manure already in the soil. Rape seems to invariably do well under such conditions, and the poultry manure, being rich in plant food, is just what the rape needs to give good returns. In spring, the chickens and fowls revel in it, and thrive. The exercise the chickens receive jumping for the top leaves helps to keep them healthy.

Perhaps no crop that can be cheaply grown near the piggeries is as useful as rape. It is a healthy fattening food, and may be fed to the pigs, or they may be allowed to graze on it. It has been grown at the College for the purpose for the last eighteen years, sometimes alone, and sometimes in conjunction with barley.

OTHER USES OF RAPE.

Rape is an excellent crop for green manuring, when a soil is deficient in organic matter, but in the Northern districts very little direct green manuring is done, but by eating down the rape with sheep the soil is much enriched for any succeeding crop. Immediately the rape is eaten down at the end of the season, the land may be ploughed, and may again be sown with a summer crop, such as amber cane, maize, or millet, and again eaten down by stock, thus adding more organic and fertilizing matter to the soil. A good deal depends on the time the summer rains come whether the amber cane will be ready to be eaten off before April. If the land is needed for cropping, it should be ploughed and sown down before the middle of May.

Rape is not a good crop for the silo. Rape silage has been made here on several occasions. It preserves well, but the resulting food is too pungent, smelling of the sulphurous oils present in it, and flavours too strongly meat or milk from animals fed on it.

Rape is seldom grown in this State for seed purposes. It may be grown much cheaper in other places as an oil-producing plant. In such places the plants are cut and bundled before the pods burst, allowed to dry in the open, and then threshed. Here the seed is sometimes stripped with the wheat stripper slightly modified. There is, however, a good deal of waste.

Some Results of Experiments in Victoria and Elsewhere.

Hungry animals should not be turned on to a rape crop, otherwise hoven or bloat will occur amongst them, more especially if the rape is wet.

It is advisable not to grow rape on the same field frequently. It does not appear, as a rule, to succeed as well as when sown down with it at intervals of several years.

When a field has been manured with rank manures, especially those rich in nitrogen, rape is an excellent crop. Any of the cereals grow too rank, and are liable to be lodged or caught by the hot winds of November. The lengthening of the growing period before running to seed is, in the case of rape, an advantage, while in our climate it is bad for the grain crops.

Rape supplies much organic matter to the soil by means of the decay of its roots alone. This plant has a good root system, as may be expected from its rapid growth and supply of fattening foliage. If the season is favorable it is ready to graze in less than three months. White mustard is ready a month earlier.

If rape is not cut too close to the ground, or is not fed down too severely, a second and third crop may be obtained. Last year the rape on one small paddock with an eastern slope, was cut early in the season, and since then it has been fed off three times by sheep.

COST PER TON OF GROWING AN ACRE OF RAPE. YIELD 8 TONS PER ACRE.

	Farm Labour.		Contract.		
	s.	*d.*	*£*	*s.*	*d.*
To rent of 1 acre, 7s.; rates and taxes, 6d. ...	7	6	0	7	6
,, Ploughing, horse feed, labour, interest, &c.	3	6	0	5	6
,, 2 harrowings (discing, if needed, 1s. and 1s. 8d. extra) ...	0	10	0	1	6
,, Sowing seed and fertilizer ...	1	4	0	2	6
,, Rolling or light harrowing ...	0	5	0	0	9
,, 1 cwt. of superphosphate ...	5	0	0	5	0
,, 4 to 5 lbs. of seed ...	1	3	0	1	3
Cost per acre ...	19	10	1	4	0
Cost per ton of fodder ...	2	$5\frac{3}{4}$	0	3	0

The cost of putting in one acre of rape on fallow land would amount to at least 50 per cent. more for rent, the land being idle longer. Then there would be two cultivations of the fallow with the spring tooth harrows (1s. 4d. and 2s. for farm and contract work respectively). The extra cost is compensated by the increased yield, and the supply of fodder being available when most needed. The resulting credit returns of a

crop of rape, due to the fertilizing of the soil, cleaning of the field by feeding down with sheep, also the increased value of the sheep as fats, make a well-grown crop very profitable.

NUMBER OF SHEEP TO THE ACRE.

It is evident that the number of sheep to the acre that a rape crop will carry depends on several conditions, but the two principal ones are the earliness of the crop and its weight per acre. The latter is due to the season and soil being suitable and well-drained. The earliness of the crop extends the time of feeding, and this is an advantage with farmers' flocks, as they are not generally large, and the crop is well eaten down by the beginning of summer. Several growths are obtained, provided the plants are not eaten out at first, and in this way a heavy bulk of fodder is produced and utilized when most needed. Fewer sheep to the acre for a longer period will be carried, and consequently there is less trampling, with freshening intervals. When the crop is allowed to reach its full growth before seeding, it sometimes happens that it grows faster than the sheep can eat it, especially if there be a limited number to feed it off. When the crop is well above the surface, the effects of the excreta from the sheep are not so objectionable, and more sheep to the acre may be put on without fouling so much of the fodder, for the sheep undoubtedly use much discrimination. It is advisable to occasionally take the sheep off for a week or more, according to the needs of the crop. During some seasons there have been occasional crops at the College that would carry from ten to fifteen sheep to the acre for four months, and on one or two occasions it has rushed to seed, the plants, when in flower, being over the heads of horses that were also grazing on the crop. Where a crop goes to seed there is more labour involved in ploughing the field, and there is an exhaustive effect on the soil. The average crop of rape, however, in this district will not carry more than four sheep to the acre for three to four months. It must be remembered in these cases that the field is not heavily manured, and the cleansing effect of the crop is a great additional advantage.

AGRICULTURAL EDUCATION.

Report on Classes held during 1905.

F. E. Lee, Agricultural Superintendent.

This past year has seen such a great expansion in the work of the Agricultural Classes, that some slight review of the whole scheme may not be out of place. Inaugurated in 1902, by Mr. S. Williamson Wallace, late Director of Agriculture, to meet an obvious demand on the part of the younger generation of farmers and others interested in agricultural pursuits, the classes were not long in becoming popular among those who attended. The small number of centres selected in the first year, viz., three, was increased to seven in 1904, and to eleven in 1905. It is highly gratifying to those who have charge of this important branch of the general scheme of agricultural education to know that no less than 31 applications were received, distinct evidence not only of their popularity, but a recognition of their educational advantages as well. Had

the Department a staff complete enough to have accepted all the invitations to establish classes, the number would have been greatly enlarged, but when it is remembered that the lecturers attached to the Department have, in addition to their work at the classes, other duties to perform, it is hardly surprising that the number of centres was limited to those which could be accomplished within a given time.

It may not be out of place to remark that the qualities which make a successful lecturer to adults are not necessarily identical with those for a similar duty to students. Lucidity of expression, prominence given to fundamental principles, and above all, simplicity of language are not the least of the requirements necessary to arrest the attention of large gatherings of men of mixed ages, such as one finds daily attending these classes.

The subjoined results of the voluntary examinations are sufficient guarantee that a great proportion of the students benefited materially by the instruction given. What is perhaps more important still—the thoughts of many have been directed into channels, hitherto unknown, the systematic following up of which must inevitably leave its mark on the agricultural progress of each locality where classes have been held.

Agricultural Students Associations.

At the termination of each class, the suggestion was made by the writer that in order to keep up the interest, and make the work continuous, the students, with the assistance of any other persons interested, should form among themselves an association which would have for its object, the formation of a small library of approved text-books on agricultural and kindred topics, which might circulate among the members. A nominal subscription only was suggested in order to facilitate the formation of the associations, the management of which would devolve upon local office-bearers. Some six or eight of these associations have either been formed or are in process of formation, and it is thought that they will be the means, in the future, of spreading useful information and bringing to the front any latent talent in agricultural matters.

Classes held during 1905.

Classes were established at Nhill, Geelong, Stawell, Kaniva, Warracknabeal, Donald, Murchison, Numurkah, Nagambie, Dunolly, and Ballarat, the term of each (with the exception of Nhill), being two weeks.

The lecturers were as follow:—

Dr. Cherry.—Introductory Lecture.
F. E. Lee.—Manures, Cultivation, and Experimental Work.
A. S. Kenyon.—Agricultural Surveying and Water Conservation.
G. H. Adcock.—Agricultural Botany and Diseases of Plants.
R. Crowe.—The Export Trade.
R. T. Archer.—Dairying and Dairy Management.
H. V. Hawkins.—Poultry Management.
D. M. Boyd.—Agricultural Surveying.
M. d'a. Burney.—Viticulture.
H. S. Rudduck.—Veterinary Science.
W. C. Robertson.—Agricultural Chemistry.
W. Haile.—Wool Sorting and Classing.
W. Kenneally.—Practical Farriery.
E. Plumridge.—Wool Sorting and Classing.

The average daily attendance taken as a whole constitutes a record, and with one exception every centre has completely justified its request for the establishment of a class.

The following table gives an analysis of the attendance and results of examination for each centre, the large number of visitors who attended more or less regularly not being included in the return:—

Centre.	Number of Students Enrolled.	Average Daily Attendance.	Number of Examination Papers.	Percentage of Marks Gained by each Centre.
Nhill ...	86	55	127	48.39
Geelong ...	97	53	122	37.78
Stawell ...	87	45	64	45.28
Kaniva ...	122	79	183	32.44
Warracknabeal	66	42	74	31.67
Donald ...	71	37	38	53.90
Murchison ...	112	45	50	40.15
Numurkah ...	186	72	92	29.49
Nagambie ...	116	52	87	35.92
Dunolly ...	98	47	65	55.66
Ballarat ...	33	16	25	51.06

The above figures show that 1,074 students attended the lectures. The total number of examination papers in all subjects was 926, showing the highly creditable average of nearly 50 per cent. of the maximum number of marks obtainable for each student.

EXAMINATION RESULTS.

Examination papers were set by Messrs. Lee, Rudduck, Kenyon, Boyd, Hawkins, Haile, Archer, Adcock, Robertson, and Plumridge. The brief time allowed for examination only permitted of a few comprehensive questions being set by each lecturer. Regarded as a test of how the instruction had been received, the results are highly favorable, and are an indication that the great majority of students possess a good knowledge of the leading features of each subject.

The following are the detailed results for each centre:—

NHILL.

Student's Name.	Lee.	Rudduck.	Adcock.	Hawkins.	Haile.	Robertson.	Total.	Percentage of Maximum
Dahlenberg, H. A.	89	90	90	80	97	84	530	88·3
Hensley, W. A. ...	85	90	85	75	98	90	523	87·1
Pilgrim, P. ...	79	80	80	85	94	92	510	85·0
Bond, J.	65	86	80	45	72	59	407	67·8
Sanders, W. C. ...	70	50	50	65	85	78	398	66·3
Wheaton, C. M. ...	66	56	60	45	65	90	382	63·6
Weir, A. ...	60	40	75	50	72	69	366	61·0
Hoffmann, E. G. ...	68	65	...	50	91	64	338	56·3
Welsh, W. ...	52	60	35	40	58	45	290	48·3
Shanasy, J. ...	53	55	...	55	51	47	261	43·5
Langtry, L. ...	40	25	40	35	50	44	234	39·0
Meagher, J. ...	29	30	40	20	85	22	226	37·6
Dahlenberg, P. ...	40	32	40	20	62	15	209	34·8

NHILL—*continued.*

Student's Name.	Lee.	Rudduck	Adcock.	Hawkins.	Haile.	Robertson.	Total.	Percentage of Maximum.
Geneil, J. ...	33	30	30	35	64	16	208	34·6
Moulden, S. ...	28	35	...	40	50	30	183	30·5
Peapes, G. ...	30	30	5	20	65	29	179	29·8
Wohlers, A. ...	28	42	30	40	...	...	140	23·3
Steadman, G. ...	38	46	...	55	...	...	139	23·1
Weir, W. ...	24	58	...	20	...	13	115	19·1
Hales, H. ...	50	...	...	35	...	...	85	14·1
Sherwood, Miss ...	68	...	50	90	95	77	380	63·3
Garretty, Miss ...	62	...	65	75	96	73	371	61·8
Shanasy, Miss B. ...	68	...	80	79	...	86	313	52·1
Towns, Mrs. ...	...	...	55	86	...	45	186	31·0
Gladigan, H. ...	...	...	...	...	80	...	...	Non-competitive.
Schmidt, F. ...	...	...	...	...	80	...	...	
Batson, J. ...	...	...	...	...	70	...	...	
McPherson, L. ...	...	...	...	...	58	...	...	

GEELONG.

Student's Name.	Lee	Rudduck.	Hawkins.	Boyd.	Archer.	Plumridge.	Total.	Percentage of Maximum.
Stewart, H. L. ...	87	82	100	65	100	85	519	86·5
Farrer, J. F. ...	88	76	100	50	100	90	504	84·0
Fargie, A. J. ...	82	90	100	85	99	40	496	82·6
Grace, F. ...	67	95	100	35	100	85	482	80·3
Anderson, G. ...	50	58	56	65	91	100	420	70·0
Fraser, R. ...	...	82	95	...	99	85	361	60·1
McDonald, D. M. ...	3	10	88	35	89	50	335	55·8
Cecil, Ash ...	74	45	54	15	90	40	318	53·0
Heard, R. E. ...	...	73	90	20	93	40	316	52·6
Weitnaur, E. ...	...	44	88	35	89	50	306	51·0
Hennessy, J. M. ...	...	60	95	...	99	20	274	45·6
Robb, T. ...	45	25	76	25	94	...	265	44·1
Errey, John ...	15	55	74	25	91	...	260	43·3
McGuinness, M. W.	70	...	80	...	95	...	245	40·8
Anderson, A. ...	55	...	40	30	92	25	242	40·3
Trebilcock, F. ...	...	45	72	...	92	...	209	34·8
O'Brien, A. ...	52	...	78	5	72	...	207	34·5
Devlin, C. ...	...	25	80	...	85	15	205	34·3
Sutherland, H. D.	46	43	...	30	...	80	199	33·1
Crossley, O. E. ...	...	...	100	...	94	...	194	32·3
Ritchie, F. D. ...	...	...	100	...	80	...	180	30·0
Jackson, John ...	...	...	80	...	85	...	165	27·5
Spowart, W. G. ...	...	...	70	...	92	...	162	27·0
Smith, G. H. ...	...	...	56	...	92	...	148	24·6
Bowman, C. ...	...	20	40	...	82	...	142	23·6
Jackson, P. ...	...	...	40	...	91	...	131	21·8
Anderson, D. J. ...	31	68	...	10	...	20	129	21·5
Fogarty, P. ...	...	52	...	...	...	55	107	17·8
Howell, J. L. ...	...	...	...	...	...	85	85	14·1
Heyward, G. ...	...	...	...	...	...	85	85	14·1
Lowe, Eric ...	...	...	...	...	...	80	80	13·3
Judd, A. O. ...	...	50	...	...	...	...	50	8·3
Pearson, A. ...	...	...	...	...	...	45	45	7·5
Ham, E. W. ...	...	...	...	...	...	40	40	6·7
Cozens, J. ...	...	...	...	...	...	35	35	5·8

STAWELL.

Student's Name.		Lee.	Rudduck.	Hawkins.	Haile.	Total.	Percentage of Maximum.
McMurtrie, J. A.	...	75	86	85	85	331	82·7
Whitehead, W. A.	...	49	78	90	95	312	78·0
Best, C.	...	50	76	75	80	281	70·2
Reading, A. M. ...	...	50	80	55	85	270	67·5
Vance, A.	...	62	40	65	90	257	64·2
Falls, H.	...	45	68	60	70	243	60·7
Freeman, W. S. ...	...	30	68	65	78	231	57·7
Smith, J. T.	...	35	50	55	80	220	55·0
Kilpatrick, W. A.	...	50	71	...	95	216	54·0
Taylor, R. B. ...	...	25	...	75	90	190	47·5
Hutchings, J. C.	...	...	...	90	100	190	47·5
McKay, A.	...	54	70	50	...	174	43·5
Smith, Jas. H. ...	...	15	40	55	50	160	40·0
Garnett, W. F. ...	...	...	...	52	93	145	36·2
Sinclair, W.	...	...	...	45	67	112	28·0
Martin, W.	...	...	25	80	...	105	26·2
May, A.	...	...	...	...	100	100	25·0
Pinchard, A.	...	...	...	...	95	95	23·7
Rathgeber, F. ...	...	...	...	75	...	75	18·7
Cato, Mrs.	...	...	...	100	...	100	25·0
Grieve, Mrs.	...	...	...	90	...	90	22·5
Cook, Miss E. ...	...	...	...	90	...	90	22·5

KANIVA.

Student's Name.		Lee.	Rudduck.	Hawkins.	Haile.	Kenyon.	Total.	Percentage of Maximum.
Rowe, Edwin G.	...	61	56	90	100	65	362	72·4
McCallum, L. C.	...	83	78	78	68	55	362	72·4
Schmidt, Andrew	...	64	80	66	95	50	355	71·0
Crouch, W. J.	...	58	68	88	60	50	324	64·8
Sanders, C. ...	...	70	66	70	60	50	316	63·2
Steer, A. F. ...	...	28	63	52	85	30	258	51·6
Goodwin, F. ...	...	36	75	70	70	...	251	50·2
Feder, F. ...	...	37	48	44	70	50	249	49·8
Moar, S. J.	...	25	52	72	60	35	244	48·8
Schmidt, F. H.	...	22	55	68	65	30	240	48·0
Crouch, Albert G.	...	47	44	48	70	30	239	47·8
ing, Fred. ...	...	27	58	72	55	25	237	47·5
leCallum, C. ...	...	24	55	76	80	...	235	47·0
Webb, Oliver ...	...	...	63	70	80	20	233	46·6
rouch, H. ...	...	46	55	68	55	...	224	44·8
ivian, John ...	...	28	58	48	50	35	219	43·2
icholls, H. ...	...	30	39	70	50	15	204	40·8
odwin, P. ...	...	...	52	72	76	...	200	40·0
le, M. ...	...	37	50	44	53	10	194	38·8
ltmarsh, E.	...	20	50	48	57	15	190	38·0
ouch, E. J. ...	...	24	.45	68	50	...	187	37·4
wrance, B. J., sen.	...	41	66	66	...	...	173	34·6
rian, F. ...	...	15	46	50	50	10	171	34·2
lland, J. D.	...	...	40	50	78	...	168	33·6
hur, F. J.	...	...	45	50	67	...	162	32·4
ian, A. W.	...	20	26	55	60	...	161	32·2
ton, F. ...	...	...	50	58	50	...	158	31·6
stridge, N.	...	13	20	38	70	15	156	31·2
lers, A. E.	...	...	...	64	90	...	154	30·8
b, A. ...	...	...	...	76	75	...	151	[illegible]

KANIVA—*continued.*

Student's Name.	Lee.	Ruddock.	Hawkins.	Haile.	Kenyon.	Total.	Percentage of Maximum.
Goodwin, A. W. ...	...	..	84	67	...	151	30·2
Goodwin, J. A. ...	...	...	74	63	...	137	27·4
Werrett, W. F. ...	16	30	44	45	...	135	27·0
Bond, H. W.	...	...	93	40	...	133	26·6
Henstridge, F. ...	12	36	58	25	...	131	26·2
Lloyd, A. E.	...	63	68	...	...	131	26·2
Arthur, W.	...	10	44	75	...	130	26·0
Gardiner, Pressey ...	20	30	50	20	5	125	25·0
Moll, E. E.	...	25	58	40	...	123	24·6
Feder, H.	17	8	42	30	25	122	24·4
Gardiner, J.	...	...	58	57	...	115	23·0
Rabone, H.	24	60	...	...	25	109	21·8
Baker, H. E.	23	44	...	...	30	97	19·4
Eastwood, E. W. ...	...	...	...	85	...	85	17·0
Hicks, John	..	64	...	...	...	64	12·8
Lawrance, B.	...	60	...	...	...	60	12·0
Goldsworthy, L. J. ...	...	...	46	...	...	46	9·2
McDonald, Alex. ...	...	...	38	...	...	38	7·6
Sherriff, F. J.	...	...	20	...	...	20	4·0
Neilson, Miss L. ...	...	...	100	...	...	100	20·0
Vivian, Miss A. ...	...	...	99	...	..	99	19·8
McCallum, Miss L. ...	...	...	95	...	...	95	19·0
McCallum, Miss M. E. ..	...	...	94	...	...	94	18·8
Eastwood, Mrs. E. W. ...	...	...	94	...	..	94	18·8
Wastell, Miss H. ...	...	...	93	...	...	93	18·6
Link, Miss A. ...	...	...	90	...	...	90	18·0
Nicholls, Miss M. ...	...	...	90	...	...	90	18·0
Coutts, Miss O. ...	...	...	90	...	...	90	18·0

WARRACKNABEAL.

Student's Name.	Lee.	Rudduck.	Hawkins.	Haile.	Kenyon.	Total.	Percentage of Maximum.
Bartram, R.	90	56	89	100	80	421	84·2
Bemmett, J.	60	73	89	95	70	387	77·4
Bryant, G.	65	82	100	70	55	372	74·4
Sherriff, H. A. ...	28	76	98	80	...	282	56·4
Harris, W. E.	25	38	70	65	45	243	48·6
Clarke, W. J.	32	56	30	62	30	210	42·0
Heath, J.	20	40	55	60	10	185	37·0
Kelm, Max	8	35	40	51	35	168	33·6
Robinson, D. S. ...	5	37	30	55	30	157	31·4
Couzner, A. T. ...	15	10	45	50	25	145	29·0
Hayter, F.	...	...	50	75	...	125	25·0
Gildea, G.	...	...	55	66	...	121	24·2
Abbott, W.	...	...	50	62	...	112	22·4
Nottle, R. F.	...	...	50	60	..	110	22·0
McLean, L., jun. ...	...	...	40	60	...	100	20·0
McLean, H.	...	...	40	55	...	95	19·0
McIntyre, F.	...	...	35	55	...	90	18·0
Hewitt, E.	...	...	35	50	...	85	17·0
Kinghorn, F. R. ...	...	...	40	30	...	70	14·0
King, E. H.	...	...	15	40	...	55	11·0
Aitkin, C. E.	...	...	30	20	...	50	10·0
Noske, F.	...	...	15	...	...	15	3·0
Cook, Mrs. R.	...	...	35	10	...	45	9·0

DONALD.

Student's Name.	Rudduck.	Hawkins.	Haile.	Kenyon.	Adcock.	Total.	Percentage of Maximum.
Pearse, W. N. ...	80	80	75	80	90	405	81·0
Moore, W. T. ...	76	85	85	65	85	396	79·2
Pearse, E. E. ...	50	60	62	85	90	347	69·4
Tyson, A. ...	74	65	98	...	93	330	66·0
Leslie, J. M. ...	55	65	55	80	75	330	66·0
Hepworth, W. ...	30	59	80	30	85	284	56·8
Harris, E. A. ...	90	...	...	70	60	220	44·0
Morgan, E. ...	...	45	90	...	...	135	27·0
Moore, F. F. ...	...	59	67	...	...	126	25·2
Adams, S. J. ...	...	65	57	...	...	122	24·4

MURCHISON.

Student's Name.	Lee.	Rudduck.	Hawkins.	Haile.	Boyd.	Total.	Percentage of Maximum
Orr, J. A. ...	85	63	60	55	75	338	67·6
Brisbane, W. B. ...	45	56	95	97	15	308	61·6
Blaikie, C. S. ...	35	60	66	73	45	279	55·8
Welfare, G. W. ...	50	45	75	85	15	270	54·0
Tobe, C. ...	88	53	25	70	30	266	53·2
Orr, Wm. R. ...	63	50	40	95	15	263	52·6
Brown, R. ...	50	70	30	45	5	209	41·8
Gregory, H. ...	30	65	...	95	...	200	40·0
Harper, A. ...	45	82	...	...	55	182	36·4
Porter, Wm. ...	51	30	...	...	10	91	18·2
Murray, J. P. ...	...	...	30	40	...	70	14·0
Keady, T. F. ...	...	...	30	40	...	70	14·0
Clark, J. P. ...	..	...	25	40	...	65	13·0

NUMURKAH.

Student's Name.	Lee.	Rudduck.	Hawkins.	Haile.	Archer.	Kenyon.	Total.	Percentage of Maximum.
Moss, H. J. ...	25	86	40	48	98	57	354	59·0
Chapman, R. ...	45	50	60	35	97	55	342	57·0
McDowell, R. M. ...	73	46	70	...	90	60	339	56·5
Hick, D. P. ..	25	86	55	25	97	50	338	56·3
Rowe, W. ...	12	70	35	40	94	35	286	47·6
Moss, F. G. ...	40	65	10	45	92	20	272	45·3
Mortimer, J. ...	40	55	5	35	94	30	259	43·1
Fairless, W. S. ...	20	62	25	30	94	25	256	42·6
Graham, A. ...	30	58	30	48	75	10	251	41·8
Armstrong, W. ...	33	...	...	50	96	50	229	38·1
Harvie, W. C. ...	...	60	55	...	94	...	209	34·8
Sullivan, H. ...	60	40	55	...	...	35	190	31·6
Armstrong, R. ...	...	35	30	30	90	...	185	30·8
Bourchier, M. ...	10	10	...	35	86	25	166	27·6
Gordon, R. C. ...	...	68	85	...	...	...	153	25·5
Morris, F. ...	...	66	35	...	...	...	101	16·8
Armstrong, A. E....	...	53	15	30	...	...	98	16·3
Bennett, C. A. ...	...	...	...	...	97	...	97	16·1
Hick, C. D. ...	...	...	...	...	94	...	94	15·6

NUMURKAH—*continued.*

Student's Name.	Lee.	Rudduck.	Hawkins.	Haile.	Archer.	Kenyon.	Total.	Percentage of Maximum.
Knox, J. ...	...	55	35	...	...	...	90	15·0
Bourchier, C. ...	...	...	...	...	89	...	89	14·8
Thomson, T. ...	...	55	30	...	...	...	85	14·1
Moss, Wm. ...	...	...	...	...	80	...	80	13·3
Hick, S. ...	...	...	...	...	70	...	70	11·6
Sullivan, J. ...	...	60	...	...	...	...	60	10·0
Bunnell, C. A. ...	...	53	...	...	...	...	53	8·8
McDonald, R. ...	...	...	...	50	...	...	50	8·3

NAGAMBIE.

Student's Name.	Lee.	Rudduck.	Hawkins.	Haile.	Archer.	Kenyon.	Total.	Percentage of Maximum.
Furlong, J. ...	80	60	35	85	93	60	413	68·8
Donovan, T. ...	60	42	50	82	94	...	323	54·6
Wilson, J. W. ...	42	55	36	50	88	50	321	53·5
Baud, W. C. ...	40	74	50	50	82	45	296	49·3
Baud, H. C. ...	5	50	50	70	93	25	293	48·8
Wilson, W. H. ...	45	58	36	50	70	30	289	48·1
Adams, J. ...	26	68	35	55	82	...	266	44·3
Tweddle, R. ...	38	52	20	50	70	30	260	43·3
Baud, H. B. ...	40	40	40	70	85	62	252	42·0
McKinley, R. J. ...	40	50	20	55	80	45	245	40·8
Orpwood, T. ...	20	5	50	45	70	40	230	38·3
Smith, G. ...	45	80	...	...	82	...	207	34·5
Boddey, A. ...	60	38	30	62	...	...	190	31·6
Adams, W. ...	10	20	6	55	85	10	186	31·0
Furlong, F. ...	45	30	...	...	91	...	166	27·6
Ryan, E. J. ...	...	...	40	50	...	...	90	15·1
Dolphin, O. ...	...	...	90	...	...	...	90	15·1
Muller, J. ...	...	...	...	75	...	...	75	12·5
Hudson, A. J. ...	...	...	20	50	...	...	70	11·6
Dwyer, M. D. ...	...	...	6	40	...	...	46	7·6

DUNOLLY.

Student's Name.	Lee.	Rudduck.	Hawkins.	Adcock.	Archer.	Kenyon.	Total.	Percentage of Maximum.
Forbes, J. ...	77	73	90	80	92	60	474	79·0
McPherson, W. ...	80	73	70	75	91	75	464	77·3
Howard, J. ...	65	65	42	75	94	78	419	69·8
Nixon, F. D. ...	64	42	70	75	89	50	390	65·0
Howard, C. W. ...	81	54	50	75	91	...	351	58·5
Costello, P., jun. ...	60	55	60	60	92	10	337	56·1
Dam, H. H. ...	58	50	45	50	95	35	333	55·5
Lummis, J. ...	70	25	40	65	83	50	333	55·5
Melton, J. ...	50	60	40	50	91	35	326	54·3
Freemantle, Jas. ...	54	50	40	35	82	35	296	49·3
Freemantle, J. (Mt. Hooghly) ...	70	20	55	...	95	...	240	40·0
Freemantle, J. (Bet Bet) ...	25	20	...	...	...	...	45	7·5

BALLARAT.

Student's Name.	Lee.	Ruddock.	Hawkins.	Haile.	Archer.	Kenyon.	Total.	Percentage of Maximum.
Kerry, C. H. ...	45	66	90	40	95	73	409	68·1
Adeney, J. H. ...	50	80	85	50	85	53	403	67·1
Adeney, E. M. ...	48	70	45	55	90	60	368	61·3
Robinson, J. B. ...	36	...	90	...	84	...	210	35·0
O'Hara, J. ...	...	33	...	10	30	70	143	23·8

PRIZE WINNERS.

The honour of winning the gold medal offered by the Australian Natives Association for the student gaining the best aggregate of marks in all subjects, belongs to Nhill. Mr. H. A. Dahlenberg, a young farmer of that district, secured an aggregate of 530 marks out of a possible 600, or 88.3 per cent. of the maximum possible. A scrutiny of the points awarded at each centre will show that there were many excellent papers, and the winner had no easy task to carry off the prize from 252 competitors. It is worthy of remark that Mr. Dahlenberg was a student at the Nhill class in 1904, on which occasion he did not go up for examination. It is most gratifying to find a young farmer, already having a sound practical knowledge of agricultural methods, recognising the advantages of education in the more technical side of his occupation, and there is every reason to believe that the instruction so gained will not be lost to the district in which he resides.

The members of the Corio Shire Council subscribed the sum of £25, to be applied to the encouragement of agricultural education in the Geelong district. It has been decided to allot £5 to form the nucleus of a library of books on agricultural subjects for the Students' Association, and the balance will be awarded as a scholarship in the Agricultural High School, which it is proposed to establish shortly in Geelong.

Prizes of medals, trophies, books, or cash, were donated by leading residents of the Nhill, Geelong, Stawell, Kaniva, Donald, Murchison, and Nagambie districts. The prizes have been awarded on the basis that no student could win more than one prize for individual subjects but was eligible to compete for the "best aggregate," where offered, as well. The following are the awards of prizes:—

NHILL.

Several prizes were offered for individual subjects, and for attendance, the allotment of which was left in the hands of the Nhill Agricultural and Pastoral Society.

GEELONG.

Agricultural Subjects.—1st, J. Farrer, 10s.; 2nd, H. L. Stewart, 5s.

Veterinary Science.—1st, F. Grace, 10s.; 2nd, A. J. Fargie, 5s.

Surveying, &c.—1st, A. J. Fargie, 10s.; 2nd, H. L. Stewart, G. Anderson, 5s.

Dairying.—1st, H. L. Stewart, F. Grace, J. F. Farrer, 15s.

Poultry.—1st, H. L. Stewart, J. F. Farrer, A. J. Fargie, F. Grace, O. E. Crossley, F. D. Ritchie, 15s.

Wool Sorting.—1st, G. Anderson, 10s.; 2nd, J. F. Farrer, 5s.

STAWELL.

Agricultural Subjects.—1st, J. A. McMurtrie, 10s.; 2nd, A. Vance, 5s.
Veterinary Science.—1st, A. M. Reading, 10s.; 2nd, W. A. Whitehead, 5s.
Wool Classing.—1st, J. C. Hutchings, 10s.; 2nd, W. A. Kilpatrick, 5s.
Poultry.—1st, Mrs. Cato, 10s.; 2nd, Mrs. Grieve, Miss Cook, 5s.
Prize for Best Aggregate, given by the Stawell Agricultural and Pastoral Society.—J. A. McMurtrie, £2 2s.

KANIVA.

Agricultural Subjects.—1st, L. C. McCallum, 7s. 6d.; 2nd, C. Sanders, 2s. 6d.
Veterinary Science.—1st, A. Schmidt, 7s. 6d.; 2nd, F. Goodwin, 2s. 6d.
Wool Classing.—1st, E. G. Rowe, gold medal; 2nd, A. E. Sanders, 10s. 6d.
Poultry (open to ladies only).—1st, Miss L. Neilson, gold medal.
Poultry (open to all students).—1st, Miss L. Neilson, 7s. 6d.; 2nd, Miss A. Vivian, 2s. 6d.
Highest Number of Points for Kaniva Class.—1st, E. G. Rowe and L. C. McCallum equal, £1 1s.

DONALD.

Highest Number of Points at the Donald Class.—W. N. Pearse, £1 1s.

MURCHISON.

Agricultural Subjects.—C. Tobe, 10s. 6d.
Veterinary Science.—A. Harper, 10s. 6d.
Wool Classing.—W. G. Brisbane, 10s. 6d.
Poultry.—G. W. Welfare, 10s. 6d.
Agricultural Surveying.—C. S. Blaikie, 10s. 6d.
Highest Number of Points at the Murchison Class.—J. A. Orr, 10s. 6d.

NAGAMBIE.

Highest Number of Points for the Nagambie Class.—J. Furlong, gold medal.
Highest Number of Points Combined with Best Attendance.—T. Donovan, J. W. Wilson, medal.

REPORTS BY THE LECTURERS.

Mr. F. E. Lee.—"I have been much impressed by the genuine desire of the students at all centres, to acquire full information on the subjects dealt with by me. The functions of artificial fertilizers, their valuation, and the results of the experimental work throughout the State appeared to evoke a live interest everywhere. I remarked that there is still a noticeable want of knowledge in the estimation of the value of the various fertilizers on the Victorian market. The fact that the list of unit values is published annually in the *Journal*, brought forth a number of subscribers to that publication. I have every reason to be satisfied with the general work of the classes, and can only regret that other duties precluded a more lengthy visit to each centre."

Mr. H. S. Rudduck, G.M.V.C.—"The results of the work of each class are satisfactory. I think that evening lantern lectures are a valuable aid to my work. All the practical work was splendidly attended, and considerable interest was displayed in the work of my colleague, Mr. Kenneally, at his farriery demonstrations."

Mr. A. S. Kenyon, C.E.—"To expect students to grasp such a subject as agricultural surveying, and the principles of water conservation in a few brief hours, is optimistic in a high degree. It necessitates a considerable addition to the average student's vocabulary, and calls for mental processes of an unfamiliar nature. Still, with all these drawbacks, many of the papers evince a distinct understanding of the questions, while almost all show that only a little more time was needed to obtain a better grip of the

subject. It is evident, from the answers to questions on water conservation, that the subject, being more familiar, was clearly understood. After lecturing at seven centres, and after contact with a large number of students, I am convinced much more time should be devoted to the classes, both in extension of time allowed for each subject and in the enlargement of the subjects themselves. Continuation work should not be forgotten, and the formation of agricultural students' associations should assist to this end."

Mr. R. T. Archer.—"It is very gratifying to note, on the average, a decided improvement in the papers, as compared with former years, which shows that the students have been very attentive to the lectures. As at former classes, great interest was displayed in the use of the Babcock milk tester, as a means of improving the dairy herd. I feel satisfied that this will result in a material increase in the average returns from dairy cows in Victoria."

Mr. H. V. Hawkins.—"The examination papers generally are an improvement on former years. It is worthy of remark that my subject brought forth some excellent papers by ladies. The number of junior students attending the classes this year will probably be the means of turning the thoughts of many seriously to the profits of the poultry industry."

Mr. G. H. Adcock, F.L.S.—"I was greatly pleased by the intelligent appreciation of the lectures of both centres where I lectured. The examination papers show that the students got a "grip" of the subject-matter of two vast subjects, briefly outlined in two short addresses."

Mr. D. M. Boyd.—"My subject is, at any time, a somewhat difficult one for the layman to pick up rapidly, and at the classes this was the more so on account of the brevity of the time allowed for examination. The results would have been generally more satisfactory had a greater length of time been allowed. On the whole, I am satisfied that my efforts were not in vain."

Mr. W. Haile.—"More time was spent this year in practical work, which appeared to meet with the appreciation of the students, judging by the splendid attendance everywhere. The examination papers, on the whole, were good, and from the number of letters I have received since the classes closed, I should judge that a repetition of the work in many centres would meet with an increased response from the students."

Mr. E. Plumridge.—"My work was limited to the Geelong class. The examination papers reflect credit on their authors, and I am well satisfied with the practical demonstrations of the wool classing conducted by me."

The Future Work of the Classes.

The whole scheme, viewed in the light of the experience of three years, can fairly be said to be a success. It meets a want of the younger generation of agriculturists, and being held at a period of the year when it interferes least with the ordinary work of the farm, it should, in the future, meet with ever greater success in the matter of attendance. I cannot refrain from pointing out that, while the daily attendance, as a whole, is thoroughly satisfactory, the individual attendance of students is not as regular as it should be, and to this reason I ascribe, the poor percentage of marks gained by many of the students. Certain subjects will, of course, appeal more to some students than others, but, nevertheless, an

obligation rests upon each person who enrols his name, to attend the whole course of lectures, and to submit himself for examination at the termination of the class.

It is possible that in the general scheme of agricultural education projected by the Department, the short course classes will find a place, although their constitution will probably require to be altered to fit in with other arrangements. Whatever the future may bring forth, I feel sure that the very large number of young men who have, at one time or another, attended these classes, will remember them with pleasure, and trace some of their progress to the instruction received thereat.

The harmonious relations existing at all centres between the lecturing staff and the students have played no small part in the general success of the work. To the local secretaries, and also to the general public at each centre, I am asked by colleagues to acknowledge with thanks their appreciation of the many courtesies shown them during the term of the class.

SURVEYING ON THE FARM.

A. S. Kenyon, C.E.

The great majority of the ordinary operations of surveying and levelling are well within the powers of persons of ordinary intelligence and acquirements. Knowledge of the elementary methods of arithmetic is, of course, required, and some practice in their application is advisable. Nothing more difficult than the extraction of the square root of a number is called for, though for most questions simple multiplication and division will be sufficient. The farmer will need to add some few words to his vocabulary; but these will not be many, while all methods given will be simplified as far as possible consistent with accuracy. A certain number of appliances and instruments will be required. These, for the most part, can be made by the farmer himself, while the others will cost but little. Descriptions and directions will be given as they are referred to.

Chain Surveying.

Ranging the Line.

Surveying consists of measuring lengths of lines, ascertaining areas and volumes, and fixing positions of points. As a preliminary to measuring the length of a line, it is necessary, as a rule, to range it out. For this, there are required two or three poles (Fig. 1) made of wood or iron, quite straight, about one inch or a little more in thickness, and some six

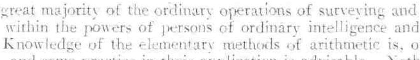

FIG. 1.

feet in length. It is well to shoe them with iron if they are to be frequently used. For convenience in sighting, they should be painted white and black, or white and red, in alternate strips of one link in length.

Thus marked, they will serve as measuring rods for short distances of under ten links. In use, the pole must be put in vertically—that is, perfectly upright. This may be done with the eye by the use of a plumb-bob, or by standing with the feet close together, and with the toes touching the bottom of the pole, the latter being upright when it touches the nose of the observer. Of course, stout men will find this last method somewhat difficult. To range the line, stand over the starting point or peg, and, sighting by a plumb-bob held directly above the peg, direct the assistant to put a pole in the line required. The pole should cover the object to which the line is being ranged. Further poles may be put in as required, care being taken that all are vertical. Instead of a plumb-bob, a pole may be put in at the starting point, and the observer may sight from it, keeping, however, some distance back from it. It is at times impossible to see the distant object from the starting point, owing to an intervening rise, or other cause. If there is any part from which both the distant object and the starting point can be seen, a pole may be put in true line by the following method:—Put one pole in line as near as you can guess it. For this purpose, an easy method is to stand with the arms extended full length, and sight along the tips of the fingers of each alternately, moving backwards or forwards until apparently in the true line. After putting the pole in, go as far as possible with another pole, or send an assistant, and range it in line with either the distant object or the starting point. If on the true line, the two poles will be in line viewed from either end (Fig. 2). If not, let the assistant range your pole with the other end. This done, range him again into line, and repeat this until both poles are in

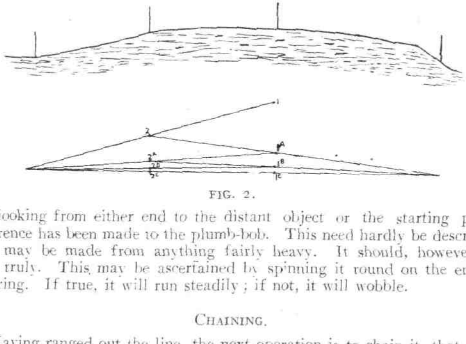

FIG. 2.

line looking from either end to the distant object or the starting point. Reference has been made to the plumb-bob. This need hardly be described, as it may be made from anything fairly heavy. It should, however, be hung truly. This may be ascertained by spinning it round on the end of its string. If true, it will run steadily; if not, it will wobble.

CHAINING.

Having ranged out the line, the next operation is to chain it, that is, to measure the number of chains and links in its length. For this, there are required chain and arrows. The chain should be of metal, either steel tape or iron links. The steel tape is preferable, as it remains practically correct, while the iron link chain is liable to stretch considerably. A steel tape chain, one half inch in width and 100 links in length, on a cross or winding frame, will cost about 25s., while an iron link one, if procurable, may be obtained for 7s. 6d. or 10s. The metallic box tape is seldom

accurate enough for decent work, it being generally too short when new, and too long when old; errors of 4 inches and over per chain are common. Arrows (Fig. 3) are made readily from No. 8 ordinary black wire, and should be ten in number. It is well to tie pieces of red cloth on the rings

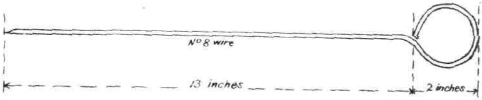

FIG. 3.

of the arrows, so that they may be more easily seen. Two persons are needed for chaining. One, generally the more experienced, is termed the follower; the other is called the leader. The leader takes the ten arrows and one handle of the chain. Proceeding in the required direction, he stretches the chain along the ground as nearly in the line as possible. The follower, holding his handle on the ground at the starting peg, directs the leader into the true line. When this is done, the leader puts in an arrow at the end of the chain, taking care to keep the chain straight and tightly strained. The leader must stand or crouch sideways while doing this, so that the follower may have an unobstructed view of the distant object. The leader then goes on, throwing the chain a little to one side, so that in drawing it along it will not touch the arrow just put in. The operation of stretching, sighting, and marking is repeated. The leader goes on again, and the follower picks up the arrow. When the leader has put in his tenth arrow, that is, after measuring ten chains, the follower comes up to him, letting the chain lie upon the ground, puts in a temporary mark, such as a knife or pencil, in place of the arrow, and hands the whole ten arrows back to the leader, who should satisfy himself that he has the full number. A note of the ten chains is made in the book, and operations proceed as before. If these directions are carefully attended to, there need never be any doubt as to the distance chained. The distance measured is the number of chains noted in the book, with the number of arrows in the hands of the follower added, together with the number of links from the last arrow to the end of the line.

CHAINING ON A SLOPE.

In measuring lines to ascertain areas, it is essential that all measurements be made on the horizontal. One or both ends of the chain will be

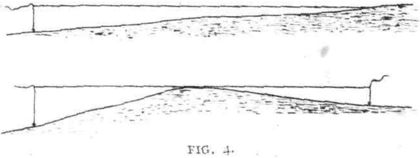

FIG. 4.

off the ground, according to the slope. Marking the end is then done by the plumb-bob (Fig. 4). All areas are given horizontally. A glance at the accompanying sketch will illustrate the necessity for this. All growth

is vertical, and so are all buildings. In the sketch, the horizontal line is divided into equal parts, and vertical lines drawn from them. It will be seen that, although the sloping line is longer than the horizontal one, it will only carry the same number of vertical lines, spaced similarly (Fig. 5). Therefore, no matter what the slope is, the horizontal measurements govern the number of plants which can be grown, as well as the number

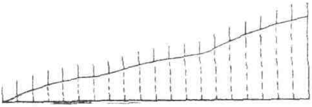

FIG. 5.

of buildings, fence-posts, &c., which can be erected. The wire required for fencing will, of course, be longer, as it follows the contour of the ground. The slope must be considerable before it is necessary to resort to the plumb-bob. The following table will show this:—

Slope.	Error in Chaining along Ground.
1 in 20 ...	... .1 per cent. too great.
1 in 10 ...	... .5 ,, ,, ,, ,,
1 in 5 ...	... 2.0 ,, ,, ,, ,,
1 in 4 ...	... 3.0 ,, ,, ,, ,,

CHAINING PAST OBSTACLES.

In chaining a line, obstacles are sometimes met with which prevent the foregoing instructions being carried out in their entirety. A simple case is that of a water-hole not too wide to stretch the chain across, but into which the end of the chain would go in the ordinary course. In this case, measure up to the edge, put in a temporary mark, for convenience, at an even number of links, stretch the full length of the chain from the temporary mark across the obstruction, and put in an arrow at the end. Then, instead of running the chain out full length, stop it at the same linkage as measured up to the edge of the obstacle, stretch as usual, and put in an arrow at the end. The rule is, only put in arrows at the leader's end, or

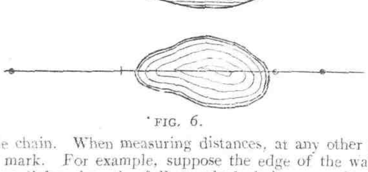

FIG. 6.

handle of the chain. When measuring distances, at any other point put in a temporary mark. For example, suppose the edge of the water-hole was at 4 chains 70 links, then the full-stretched chain across it will give the next pin at 5 chains 70 links; but the next measurement starts at the 70-link mark on the chain; consequently there are only 30 links to the next arrow, which gives the correct distance of 6 chains (Fig. 6). The link

mark used must be noted at the time, as the memory should never be trusted in surveying work. Keeping full and copious notes will save much trouble and annoyance.

If the obstacle be too wide, or if it be impassable, such as a building or a haystack, set out a chain or so back from the obstacle a perpendicular, that is, a line at right angles to the line being chained. then chain along the perpendicular a sufficient distance, generally, for convenience, in even chains, to clear the obstacle. Put in an arrow. Note the number of chains. Lay off another line at right angles to the chainage line, and close to the obstacle, and chain out the same number of chains as before, putting in an arrow at the end. You will then have two arrows in a line parallel to the chainage line, and at a known number of chains from it. The parallel line may now be extended far enough to clear the obstacle, the chainage being counted from the last arrow. A perpendicular to this line is then set up in the opposite direction to those previously set up, and the same number of chains as measured off before in the first perpendicular marked off. The point thus found will be in the original line of chainage, and will be at a distance found by adding the chains measured in the parallel line to those measured up to the obstacle. The diagram (Fig. 7) will make the operation clearer. If the obstacle cannot be sighted through to give

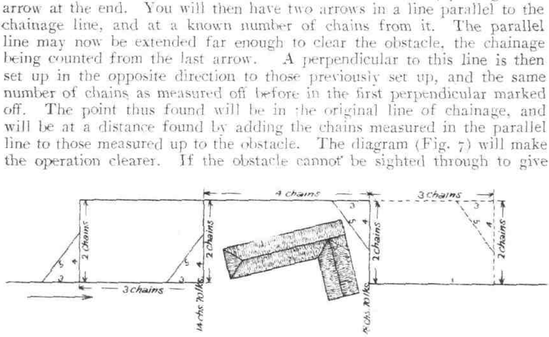

FIG. 7.

the original direction, the parallel line must be further extended, and a second perpendicular set up on the far side of the obstacle, the same number of chains marked off, and an arrow put in. The two arrows will be in the original line with the chainage given to the first. The line may then be ranged out and chained ahead as usual. The extra work necessary to get the direction beyond a lofty obstacle is shown in the diagram by the dotted lines. Occasionally another method will be found more suitable; for instance, when the obstacle is long and narrow, and there is insufficient room for the perpendicular method. This is the equilateral or equal-sided triangle method. Chain up to a suitable point, note chainage, then set up an equilateral triangle. This is done by putting in an arrow, say, 50 links further on. Hold the handles at end of chainage and at the arrow, and take the chain by the middle—that is, the 50-link mark—strain tight, and put in an arrow. The result will be a triangle, having all three sides equal, 50 links each in the case given, and having one side in the direction of the original line. Range out the side furthest from the obstacle, and chain along it until clear; note the number of chains, then set out another equilateral triangle, extend the further side the same number of chains as the previous extension, and put in an arrow. The arrow will be in the original line, and at a chainage found by adding the number of chains of

the extended side to the original chainage. The diagram (Fig. 8) shows clearly the method. If the obstacle cannot be sighted through, the original direction may be obtained by setting out another equilateral triangle, as

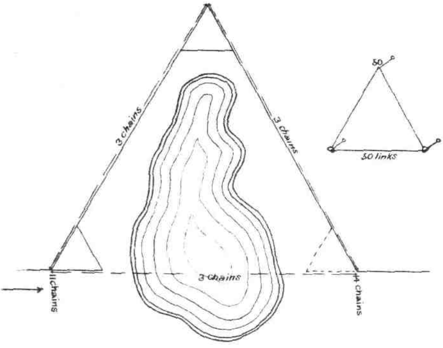

FIG. 8.

shown by dotted lines in the diagram. The base of this triangle will give the original direction of the line, which may be ranged from the two arrows at the angles of the base.

SETTING OUT RIGHT ANGLES.

The setting out of a line perpendicular—that is, at right angles—to the chainage line may be performed in several ways. The most simple and generally the most useful method is by what is known as the 3, 4, 5 method. Advantage is taken of the fact that any triangle having its sides in the proportion of 3, 4, and 5, has one of its angles a right angle. To set up a line at right angles to a point in the chainage line by this method, measure off 40 links, either backwards or onwards along the chainage line. Put in arrows at the point from which the perpendicular is to be set off, and at the point 40 links from it. Have the handles of the chain held at each of the pins, and, taking the chain by the 50 and 30 link marks, stretch tight and put in an arrow at the intersection of the marks. (See Fig. 9.) To get the line at right angles to the desired point, the 30 mark must be taken, starting from that point. The rule is—the short line of the two strained lines is at right angles to the chainage line. Any multiple of the figures given may be used so long as the proportion 3, 4, 5 holds. For instance, 15, 20, 25, or 60, 80, 100 will give the same result. Another method is by the use of the equilateral triangle, the setting out of which has been already described. Set out such a triangle. Then swing round the handle of the chain until it comes in a line with the other two arrows, and put in an arrow. This arrow will be at right angles to the point from

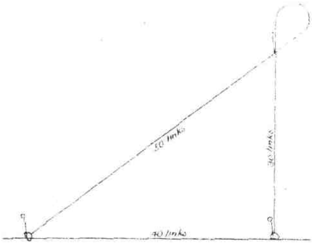

FIG. 9.

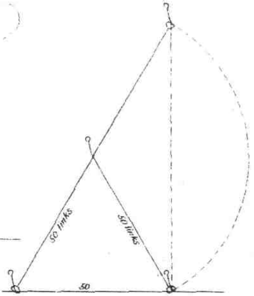

FIG. 10.

which the handle was swung. (See Fig. 10.) This method has the advantage of requiring the use of only one mark on the chain, and can in fact be employed without a marked chain at all. Using, for instance, a pair of reins, the base may be set out with the reins doubled, then opened and held at the ends of the base, and an arrow put in at the centre of the reins. The half-rein may be swung round as before, and the

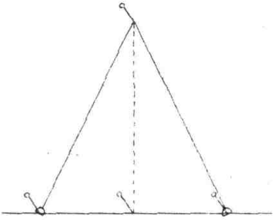

FIG. 11.

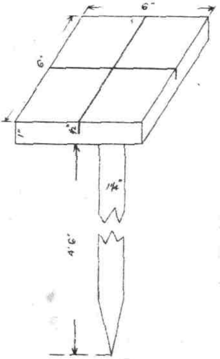

FIG. 12.

perpendicular point obtained. Still another way is to measure off equal distances on each side of the point, put in arrows, hold the ends of the chain at them, and, holding the centre mark, pull tight and put in an arrow, which will then be at right angles to the point (Fig. 11). This

method is also adapted for use by a rope or reins when no chain or other appliance is available. If much work, involving setting out perpendiculars, is required, a cheap instrument called the cross-staff (Fig. 12) should be employed. Take a piece of board about 6 inches by 6 inches; the shape is not a matter of consequence. Plane one side smooth, and on the smooth side draw two lines at right angles to one another, using a carpenter's square or a set square. Make sure that the lines are exactly at right angles by reversing the square, and by measuring carefully the same distance along each line from its intersection, and trying if the points so found are at exactly equal distances apart, as they should be. Having been satisfied that the lines are true, nail or cleats or guides, and cut with a saw two grooves along the lines, about ½ inch deep. Make the grooves clean, as they are required for sighting through. The piece of wood may then be nailed on a staff, pointed at one end, about 4 feet 6 inches in length. The cross-staff is used to set off a perpendicular to the chainage line, thus: Place the instrument vertically on the line. Turn it round until the distant object or the starting point can be seen through one of the cuts, that is, the cut is exactly in line with the original chainage line. To make sure, sight through the cut from each end. Then the assistant may be directed, by sighting through the other cut, where to put in a pole or peg at right angles. If the instrument be properly made, the pole will be in the correct position if it be turned through a quarter-circle, using the perpendicular cut to sight the chainage line, and the other,

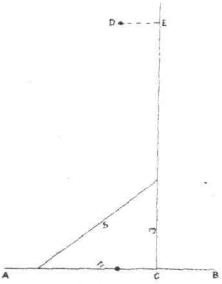

FIG. 13.

which was before used to sight the chainage line, to set out the perpendicular. For much work, such as measuring perpendicular distances of points, or setting out off-sets, the eye alone may be used. Standing exactly on the line, stretch out the arms at full length. Then, by sighting, make the hands point to each end of the chainage line, still keeping the arms fully extended. Then slowly and carefully bring the arms around at full length until the hands meet. A line sighted between the thumbs will give very approximately a perpendicular. In setting out right angles by the chainage methods to measure the perpendicular distance of a certain point, as, for instance, in measuring the areas of irregular paddocks, the line will not, as a rule, pass through the point.

It will, however, pass so close that the true distance can easily be ascertained. But the exact distance on the chainage line of the starting point of the perpendicular is frequently required. Suppose the perpendicular distance of the point D from the line AB is required. Fix the point C as nearly as can be estimated in the right position. Set out the right angle by any of the chainage methods already explained. Chain along the line so found until opposite the point D. The distance CE is the true perpendicular distance of D (Fig 13). Then measure the distance DE, and add it to, or subtract it from, as the case requires, the chainage, already noted, of C, thus obtaining the actual distance of the perpendicular line passing exactly through D.

INACCESSIBLE OBJECTS.

The operations so far described cover most of the ordinary work of surveying with the chain. Before going on to the other branches of survey work, some special cases presenting difficulties may be dealt with. They will also serve to illustrate the use of some of the methods already given. It may be found necessary to measure the distance to an object which is inaccessible; perhaps across a river or a swamp. In Fig. 14 it is required to measure the distance from A to B, where a river flows between them.

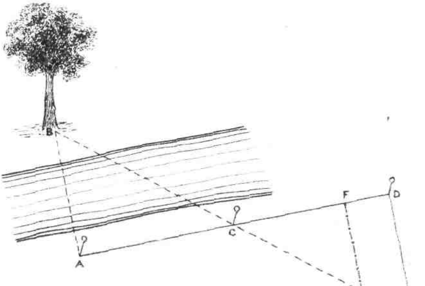

FIG. 14.

Set off at A a perpendicular to the line AB, chain along the perpendicular for a distance roughly equal at a guess to the length of AB, making it for convenience an even number of chains. Put in a pole or arrow, C. Continue chaining to D, making the distance on from C equal to the chainage from A to C. Then at D set out another perpendicular to the line ACD, and chain along it to E, E being in line with B and C. The distance chained from D to E is equal to the distance from A to B, which could not be got at. The distance DE being exactly equal to AB depends upon CD being equal to AC. Should the space available be limited, CD may be made smaller. In that case DE will be in the same proportion to AB as CD is to AC; or, in other words, AB will equal the distance from D to E, multiplied by the distance from A to C, and the result divided by the length CD.

Thus AB = (DE × AC) ÷ CD. If, for instance, the distance AC be 4 chains, and CD 2 chains, or one-half of AC, then DE will be one-half of the required distance AB. The reason for making the distance approximately equal to AB is to form what is known as a "well-conditioned" triangle of ABC. A "well-conditioned" triangle is one that has all its angles nearly equal. In such a case, the intersection, or crossing of lines, can be accurately found, as, for instance, the crossing of the lines DE and BCE; while if they had crossed at a very flat or acute angle, the intersection could not, in the field, be determined within a few links.

Should room be scanty, another method involving less space may be employed to find the distance of an inaccessible object. Again, let AB (see Fig. 15) be the distance required. As before, set off a perpendicular at A, chain AC making it nearly equal to AB, although in this case it is

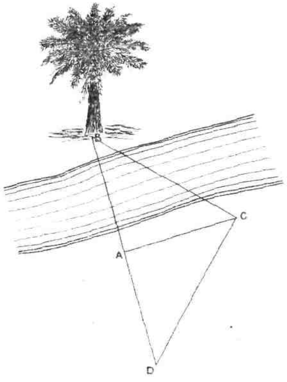

FIG. 15.

not so important. Set out at line at C, perpendicular to BC; range out the perpendicular until it cuts the line of AB at D. It need not be chained. Then chain from D to A. The distance required, AB, bears the same proportion to AC as AC does to AD, so that AB equals the distance AC multiplied by itself and divided by the distance AD. Thus $AB = AC^2 \div AD$.

The height of a tree, a stack, or other object may, when not easily measured directly, be found as follows :—Set up a pole, as tall a one as procurable, truly vertical; find by sighting the point on the ground where the line through the tops of the object and of the pole cuts it. (See Fig. 16.) Then the height of the object is in the same proportion to the height of the pole as the distance from the object to the cutting point is to that from

the pole. Using the letters on the diagram, the height AB is to CD, the height of the pole, as AE is to CE. Thus AB = (CD × AE) ÷ CE.

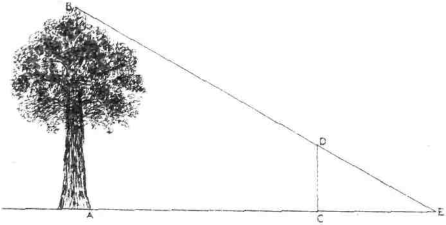

FIG. 16.

The point A must be directly below B, and the line AE must be uniformly sloping; it need not be horizontal.

GENERAL HINTS.

In all chainage work, see that the chain is straight, and well strained; that all poles and arrows are put in vertically and firmly; that all triangles are, as far as practicable, well-conditioned; and that careful and copious notes of all measurements, with sketches of lines and figures, are kept. Careful attention to the directions and to the above hints will produce work good enough for all ordinary requirements. The practical application of chain surveying to the measurement of areas and quantities will be given later.

ANGULAR SURVEYING.

Angular surveying, that is, the measurement of the angles between lines, as well as of their lengths, requires the use of instruments. Instruments, unless in the hands of trained observers, are usually dangerous, while their use requires a considerable amount of experience and skill. A farmer may find at times a prismatic, or other form of compass, of some service; but he will be well advised to leave all instruments requiring adjustment severely alone. Such survey work will be seldom required, and, when it is, it will be safer to call in the services of a professional man.

THE ORCHARD.

James Lang, Harcourt.

Owing to the late season, cherries are still plentiful in the market, which is a most unusual occurrence at this season of the year, as they are generally finished by the first week in January. Accounts complaining of light crops of all kinds of fruit have been received from nearly all fruit districts. In no district has the crop come up to expectation. The hot winds have been the chief cause of the failure, causing the young fruit to drop prematurely. It is to be hoped that better prices will rule for fruit, and thus compensate the grower for the small crop he has for disposal. If this month should turn out to be dry, irrigation will have to be resorted to where water is available. It is a mistake to put off irrigating the orchard till later in the season. The aim of the grower should be to keep the fruit growing on without a check. Keep the ground well stirred, and free from weeds, especially where the ground has been irrigated. This prevents evaporation and keeps the ground from caking. Citrus fruits should be kept well watered, as they suffer more than other trees from lack of moisture. Strawberries also will require attention; a good soaking of water now will induce the plants to bloom again, and so secure a second crop. Keep the spray going for codlin moth; also look over bandages to destroy any grubs that are harbouring under them. Growers who intend shipping a portion of their crop should make arrangements for cool chamber space as early as possible. The quantity available is limited, and should applications be too long delayed, growers may not be able to obtain sufficient for their requirements. It is very unfortunate, at the present time, that the German Government, in the new Tariff which comes into operation on the 1st March, 1906, has imposed a duty of 2s. 6d. per cwt. on apples imported into Germany. This will be a great check on exportation to that country, and will cause shippers to pause before consigning fruit there. During the last shipping season, 9,000 cases of apples were shipped direct to Germany, and the prices realized were about on a par with London returns. The German expenses, however, are rather more than what obtains in shipping to London. The additional expenditure, on account of duty, will make the charges unduly large in proportion to the prices realized. This is very much to be regretted, as, no doubt, in the course of a few years, a very much larger trade would be opened up with Germany and other Continental countries.

It is to be hoped that growers who consign their fruit to oversea markets will see that fruit of a suitable size, carefully graded and packed, is sent. Cases of a bushel capacity should be used. The small size of the cases in which some growers consign their fruit, was the cause of great complaint in London last season. This bad practice should be stopped at once, and only cases of full bushel capacity sent, and so maintain the favorable position which Victorian apples have gained on the London market. The inside measurement of export bushel cases should be 18 x 14 x 9 inches, and the outside measurement 20 x 15 x 10 inches.

ARTIFICIAL MANURES ACT 1904.

The following lists, giving the results of Analyses of Manures made during the year 1905, are published with permission of the vendors. List A comprises samples taken for examination by officers of the Department from parcels of manures in the hands of farmers, or agents, or in transit. List B comprises the samples sent to the Government Laboratory for analysis by the vendors in accordance with the Act.

W. PERCY WILKINSON,

Government Analyst and Acting Chemist for Agriculture.

A.—SAMPLES TAKEN BY OFFICERS OF THE DEPARTMENT.

Sample No.	Brand of Manure.	Manufacturer or Importer.	Nitrogen. Found.	Nitrogen. Guaranteed.	Phosphoric Acid. Found.	Phosphoric Acid. Guaranteed.	Potash. Found.	Potash. Guaranteed.
14339	Florida Super. ...	Cuming, Smith, and Co.	...	...	20.56	20.00		
14342	" " ...	" "	...	...	20.06	20.00		
14347	" " ...	" "	...	...	21.95	20.00		
14349	Grain Manure ...	" "	...	...	20.72	20.00		
14351	Florida Super. ...	" "	...	...	19.60	20.00		
14352	Grain Manure ...	" "	...	...	20.83	20.00		
14359	Florida Super. ...	" "	...	...	20.16	20.00		
14371	" " ...	" "	...	...	21.18	20.00		
14373	" " ...	" "	...	...	21.34	20.00		
14238	" " ...	" "	...	...	21.67	20.00		
14275	Nitro Super. ...	" "	.80	.70	23.37	19.37		
14288	" " ...	" "	.77	.70	22.93	19.37		
14294	" " ...	" "	.77	.70	22.21	19.37		
14296	" " ...	" "	.75	.70	22.62	19.37		
14301	" " ...	" "	.32	.70	22.17	19.37		
14376	Potato Manure ...	" "	.75	.63	19.35	17.43	6.35	5.40
14346	Nitro Super. ...	" "	.83	.70	23.00	19.37		
14348	Bone and Super. ...	" "	1.96	1.50	21.39	21.00		
14374	Nitro Super. ...	" "	.68	.70	22.24	19.37		
14375	Bone and Super. ...	" "	2.38	1.50	20.65	21.00		
14372	Thomas' Phosphate	" "	...	...	15.50	16.60		
14290	Florida Super. ...	" "	...	...	23. 6	20.00		
14299	Nitro Super. ...	" "	.73	.70	19.76	19.37		
14489	Florida Super. ...	" "	...	...	19.89	20.00		
14532	" " ...	" "	...	...	20.05	20.00		
14537	" " ...	" "	...	...	20.01	20.00		
14731	" " ...	" "	...	...	19.94	20.00		
14485	" " ...	" "	...	...	20.53	20.00		
14512	" " ...	" "	...	...	20.12	20.00		
14478	Nitro Super. ...	" "	.83	.70	22.78	19.37		
14486	" " ...	" "	.83	.70	22.83	19.37		

A.—SAMPLES TAKEN BY OFFICERS OF THE DEPARTMENT—*continued.*

Sample No.	Brand of Manure.	Manufacturer or Importer.	Nitrogen		Phosphoric Acid.		Potash.	
			Found.	Guaranteed	Found.	Guaranteed.	Found.	Guaranteed.
14703	Nitro Super. ...	Cuming, Smith, and Co.	0.74	0.70	21.91	18.49		
14706	Bonedust and Super.	" "	1.58	1.50	21.12	21.00		
14506	Florida Super. ...	" "	...	...	21.18	20.00		
14489	" " ...	" "	...	...	19.89	20.00		
14492	Florida	" "	...	...	19.10	18.00		
14505	Florida Super. ...	" "	...	...	21.90	20.00		
14515	" " ...	" "	...	...	19.40	20.00		
14523	" " ...	" "	...	...	22.19	20.00		
14383	" " ...	" "	...	...	20.65	20.00		
14385	" " ...	" "	...	...	20.47	20.00		
14720	Potato Manure ...	" "	0.71	0.74	20.67	17.39	4.27	5.40
14776	" " ...	" "	0.61	0.63	18.32	17.43	5.26	5.00
14778	Leguminous Manure	" "	0.08	...	22 00	20.75	7.26	5.00
14723	Bone and Super. ...	" "	1.22	1.50	22.37	21.00		
14734	Nitro Super. ...	" "	0.82	0.70	21.53	19.37		
14727	Florida Super ...	" "	...	...	20.91	20.00		
14332	Nitro Super. ...	" "	...	...	22.00	19.37		
14302	Florida Super. ...	" "	...	...	20.61	20.00		
14698	" " ...	" "	...	...	19.63	20.00		
14533	Orchard Manure ...	" "	...	...	18.32	15.63		
14702	Bonedust... ...	" "	2.70	2.50	20.77	21.00		
14289	"	" "	2.66	2.50	26.37	21.00		
14344	Wischer's Super. ...	Wischer and Co.	...	...	19.82	21.00		
14353	" No. 15 ...	" "	...	...	20.70	20.00		
14355	Wischer's Super. ...	" "	...	...	20.40	21.00		
14380	" ordinary	" "	...	...	21.05	21.00		
14295	" "	" "	...	...	21.72	21.00		
14504	" "	" "	...	...	21.80	21.00		
14490	" "	" "	...	...	20.89	21.00		
14507	" "	" "	...	...	21.43	21.00		
14501	" No. 15 ...	" "	...	...	19.87	20.00		
14517	Superphosphate ...	" "	...	...	19.00	20.00		
14524	" ...	" "	...	...	21.20	21.00		
14384	Wischer's Ordinary	" "	...	...	20.98	21.00		
14381	" No. 15 ...	" "	...	...	20.59	20.00		
14387	" Ordinary	" "	...	...	22.12	21.00		
14388	" No. 15 ...	" "	...	...	19.33	20.00		
14707	Grass Manure ...	" "	...	...	21.18	18.00	3.54	3.00
14735	Wischer's Ordinary	" "	...	...	20.02	21.00		
14739	" "	" "	...	...	21.11	21.00		
14528	" "	" "	...	...	21.74	21.00		
14704	" "	" "	...	...	21.34	21.00		
14705	" No. 15 ...	" "	...	...	21.14	20.00		
14350	Globe Super ...	J. Bell and Co.	...	...	18.38	18.45		
14272	" ...	" "	...	...	18.94	18.45		
14218	" ...	" "	...	...	19.22	18.45		
14480	Thomas' Phosphate	" "	...	...	15.42	16.60		
14487	Globe Super. ...	" "	...	...	18.98	18.45		
14494	" ...	" "	...	...	18.94	18.45		
14508	" ...	" "	...	...	19.32	18.45		
14357	Lascelles' Super. ...	Dennys, Lascelles, Austin and Co.	...	...	21.49	19.10		

A.—SAMPLES TAKEN BY OFFICERS OF THE DEPARTMENT—*continued.*

Sample No.	Brand of Manure.	Manufacturer or Importer.	Nitrogen.		Phosphoric Acid.		Potash.	
			Found	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.
14491	Lascelles' Super ...	Dennys, Lascelles, Austin and Co.	...	...	20.01	19.10		
14333	" " ...	" "	...	...	19.20	19.10		
14358	Federal Super. ...	Australian Explosives and Chemical Co.	...	...	20.93	19.50		
14361	" " ...	" "	...	...	23.23	19.50		
14221	" Manure ...	" "	1.68	2.00	19.07	18.05		
14224	" Nitro Super.	" "	1.07	0.98	15.22	14.90		
14334A	" " "	" "	1.16	...	17.56	18.75		
14222	" Ordinary ...	" "	...	...	20.48	19.50		
14223	" " 15%	" "	...	...	16.05	14.50		
14225	" " No. 1	" "	...	...	22.96	21.50		
14525	" " ...	" "	...	...	21.06	19.50		
14736	" " ...	" "	...	...	22.10	19.50		
14693	" Manure ...	" "	0.96	1.40	15.64	13.50		
14497	" Super. ...	" "	...	...	20.06	19.50		
14503	" " No. 1	" "	...	...	22.78	21.00		
14694	" Manure ...	" "	...	...	14.91	13.00	6.35	4.00
14785	" Potato Manure	" "	0.07	...	21.75	17.50	3.68	3.20
14737	Nitro Super. ...	" "	1.03	0.98	17.11	14.50		
14733	Federal Super. No. 15	" "	...	...	17.74	20.00		
14738	" " "	" "	...	...	16.18	14.50		
14526	" " No. 1	" "	...	...	22.34	21.00		
14531	" " No. 15	" "	...	...	17.02	14.50		
14334	" Ordinary ...	" "	...	...	22.53	19.50		
14337	Crown Brand Super.	Dixon Bros. ...	0.94	0.86	16.92	18.95		
14774	" " Super. and Bone	" ...	1.50	0.86	20.77	18.95		
14696	Super and Bonedust	J. Cockbill ...	0.71	1.30	18.11	20.00		
14219	Bonedust ...	" ...	4.27	3.50	21.68	18.25		
14220	" ...	" ...	4.13	3.50	20.52	18.25		
14240	" ...	" ...	4.80	3.50	19.88	18.25		
14297	" ...	" ...	3.41	3.50	19.30	18.25		
14690	Superphosphate ...	" ...	...	...	18.93	19.00		
14498	36/38 % Super ...	W. P. Shaw ...	...	...	18.78	17.84		
14499	" ...	" ...	...	...	19.00	17.84		
14520	Bonedust ...	P. Rohs ...	4.22	4.55	20.12	20.86		
14773	" ...	" ...	4.22	4.55	19.35	20.86		
14293	" ...	" ...	4.09	4.55	21.82	20.86		
14336	" ...	" ...	4.12	4.55	22.30	20.86		
14520	" ...	" ...	4.22	4.55	20.12	20.86		
14775	" ...	J. R. Ellsworth	4.13	3.00	21.18	19.00		
14691	" ...	A. E. Kleiner ...	3.92	3.24	23.23	20.95		
14276	" ...	Kensington M'f'g Works	3.55	3.50	20.31	19.52		
14780	" ...	" "	3.32	3.50	18.43	19.52		
14304	" ...	Waddell and Co.	3.30	3.00	16.30	17.00		
14273	" ...	Feore and Co. ...	2.83	2.43	16.89	17.69		
14771	" ...	J. R. Jopling ...	3.94	4.21	21.60	21.98		
14787	" ...	Eureka Bone Mills	4.40	3.00	19.35	19.00		

B.—SUPPLEMENTARY LIST OF MANURES ON THE MELBOURNE MARKET DURING THE 1905 SEASON.

Description of Manure.	Moisture.	Nitrogen.		Phosphoric Acid.								Where Obtainable.
				Water Soluble.		Citrate Soluble.		Insoluble.		Total.		
	Per Cent.	Per Cent.	Estimated Value in One ton of the Manure.	Per Cent.	Estimated Value in One ton of the Manure.	Per Cent.	Estimated Value in One ton of the Manure.	Per Cent.	Estimated Value in One ton of the Manure.	Per Cent.	Estimated Value in One ton of the Manure.	
			£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
Phosphoric—Readily Soluble.												
Superphosphate (S.)	11.28	..	..	20.45	5 7 4	0.66	0 3 0	..	..	21.11	5 10 4	Mt. Lyell M. and R. Coy., Melbourne
" (Hasell's) ..	11.06	..	..	20.53	5 7 9	0.94	0 4 4	..	..	21.47	5 12 1	A. H. Hasell, Queen-street, Melbourne
"	12.93	..	..	19.47	5 2 3	0.76	0 3 6	..	..	20.23	5 5 9	
" (Nitro)	13.49	..	..	16.32	4 5 8	1.95	0 9 1	0.35	0 0 4	18.62	4 15 1	Mt. Lyell M. and R. Coy., Melbourne
" (Bonedust) ..	7.13	..	..	11.27	2 19 3	3.78	0 17 0	4.23	0 4 3	19.33	3 10 6	P. M. Metzler, Nicholson-st., Fitzroy
Phosphoric—Difficultly Soluble.												
Bonedust	18.01	2.45	1 3 3	..	..	..	..	..	..	16.28	2 15 6	H. J. Feore and Coy., Lord-st., Richmond
"	9.07	4.41	2 1 10	..	..	..	..	..	..	19.46	3 11 9	J. A. Kitchen and Sons, Flinders-st., Melbourne
Digester Refuse	6.59	2.03	0 19 3	..	..	..	..	..	..	30.59	4 11 9	W. H. Taylor, Little Collins-st., Melbourne
Imperial Blood and Bone Manure	12.73	4.90	2 6 6	..	..	..	..	..	..	16.99	3 2 9	W. Angliss and Co., Footscray.
Animal Fertilizer	10.89	6.35	3 0 3	..	..	..	..	..	..	12.81	2 15 9	Newport Freezing Works, Melbourne
Mixed Manures, containing Phosphoric Acid, Nitrogen, and Potash.												
Grain Manure	10.51	0.51	0 7 6	9.18	2 8 2	2.24	0 10 5	..	..	11.42	2 18 7	P. M. Metzler, Nicholson-st., Fitzroy
Rape "	8.89	0.04	0 0 7	13.48	3 10 9	1.87	0 8 8	..	..	15.35	3 19 5	" " "
Lucerne "	8.47	0.05	0 0 5	10.54	2 15 4	1.65	0 7 8	..	..	12.19	3 3 0	" " "
Potato, Mangel, and Vegetable Manure ..												
Potato Manure	10.89	1.59	0 17 6	8.01	2 2 0	1.79	0 8 4	..	..	9.80	2 10 4	
Orchard "	9.33	1.08	0 15 6	16.48	4 6 6	1.26	0 5 10	..	..	17.74	4 12 4	Mt. Lyell M. & R. Coy., Melbourne
	9.68	1.75	0 5 0	14.63	3 16 9	1.14	0 5 3	1.09	0 3 0	16.86	4 5 0	" " "

B.—SUPPLEMENTARY LIST OF MANURES ON THE MELBOURNE MARKET DURING THE 1905 SEASON—*continued.*

Description of Manure.	Potash.		Mechanical Condition.						Estimated Total Value of Manure per To .	Price asked for Manure per Ton.*	Where Obtainable.
					Nitrogen.		Phosphoric Acid				
	Per Cent.	Estimated Value in One ton of the Manure.	Per Cent. of Fine Bone.	Per Cent. of Coarse Bone.	Per Cent. in Fine Bone.	Per Cent. in Coarse Bone.	Per Cent. in Fine Bone.	Per Cent. in Coarse Bone.			
		£ s. d.							£ s. d.	£ s. d.	
Phosphoric—Readily Soluble.											
Superphosphate (S.)	..	..	..	..	..	..	..	..	5 10 4	4 15 0	Mt. Lyell M. and R. Coy., Melbourne
,, (Hasell's) ..	..	..	..	..	..	..	..	..	5 12 1	4 7 6	A. H. Hasell, Queen-st., Melbourne
,, ...	..	..	..	..	..	..	..	..	5 5 9	4 10 0	,, ,, ,,
,, (Nitro)	..	..	..	..	..	..	..	..	5 13 4	5 0 0	Mt. Lyell M. and R. Coy., ,,
,, (Bonedust) ..	..	..	..	..	..	..	..	..	4 6 8	5 5 0	P. M. Metzler, Nicholson-st., Fitzroy
Phosphoric—Difficultly Soluble.											
Bonedust	..	..	26.98	73.02	0.67	1.78	4.09	12.28	3 18 9	5 5 0	H. J. Feore and Coy., Lord-st., Richmond
,, ...	..	..	41.42	58.58	1.82	2.59	8.06	11.40	5 13 8	5 10 0	J. A. Kitchen and Sons, Flinders-st., Melbourne.
Digester Refuse	..	..	..	..	..	2.03	..	30.59	5 11 0	6 0 0	W. H. Taylor, Little Collins-st., Melbourne
Imperial Blood and Bone Manure	..	..	39.24	60.76	1.62	3.28	7.08	9.91	5 9 3	6 0 0	W. Angliss and Co., Footscray
Animal Fertilizer	..	..	19.04	80.96	1.15	2.40	5.20	10.41	5 16 0	5 10 0	Newport Freezing Works, Melbourne
Mixed Manures, containing Phosphoric Acid, Nitrogen, and Potash.											
Grain Manure	1.49	0 8 2	..	..	..	..	..	..	5 14 3	5 10 0	P. M. Metzler, Nicholson-st., Fitzroy
Rape ,, ...	0.65	0 3 9	..	..	..	..	..	..	4 3 9	6 0 0	,, ,, ,,
Lucerne ,, ...	2.00	0 11 0	..	..	..	..	..	..	3 14 5	5 10 0	,, ,, ,,
Potato, Mangel, and Vegetable Manure	4.00	1 2 0	..	..	..	..	..	..	4 9 8	6 0 0	,, ,, ,,
Potato Manure	4.02	1 2 1	..	..	..	..	..	..	6 9 11	6 0 0	Mt. Lyell M. & R. Coy., Melbourne
Orchard ,, ...	5.35	1 9 5	..	..	..	..	..	..	6 19 5	7 0 0	,, ,, ,,

* Price asked for delivery at local railway station.

The tables on this and the preceding page refer to the same samples of manures.

Flower Garden.

The cold and generally unseasonable weather experienced during spring, followed by an unprecedented invasion of thrips, provided what have probably been the most unfavorable conditions ever experienced by rose growers in this State during the all-important spring flowering season. Practically roses have been a decided disappointment, particularly from an exhibitor's point of view. Dark coloured decorative varieties and most of the single kinds, have been fairly satisfactory, making a fair show in the gardens. Many first-class blooms, of varieties of the dark hybrid perpetual and hybrid tea sections, have been grown, but a number of the most generally reliable kinds have not produced a single good bloom, although most promising prior to the occurrence of the thrips on November 6th. The varieties illustrated are (1) "Belle Siebrecht," syn. "Mrs. W. J. Grant," hybrid tea, rose pink in colour, and one of the best roses either for garden or exhibition; a climbing sport has been "fixed" and distributed, and is to be preferred to the dwarf variety; (2) "Ards Rover," hybrid perpetual, is also a climbing rose, deep crimson in colour, a splendid spring blooming kind; and (3) "Marquise de Salisbury" hybrid tea, brilliant red, and one of the best roses for massing. The blooms are simply decorative.

Established roses should not be unduly excited during this month by heavy waterings in hot weather, but should be allowed to rest, in a measure, preparatory to the pruning and feeding for the autumn blooming. Of course no plant should be allowed to suffer to such an extent as to lose any of its foliage; and plants set out last season will need watering during dry hot weather.

Early-planted dahlias will now be well advanced, and will need to be securely tied to stakes or other supports, and be well supplied with water.

Where a sprinkler can be used, a thorough overhead watering during dry hot weather, is most beneficial. This watering should be applied in the evening. If the plants are kept moist, there is not much liability to attacks of red spider, as this pest thrives under dry conditions. When once the plants are attacked, it is a very difficult matter to eradicate them. The formation of flower buds will cause the development of lateral shoots along the main stems. If large blooms are desired, remove these laterals to within a foot of the ground, and thin out the flower buds also. After the early blooms are past the shoots that were allowed to remain on the stems will make good growth, and produce fine flowers later if the old shoots that have bloomed are cut away, and the new ones tied in their stead, and treated as the first. A light dressing of Peruvian guano, lightly forked into the soil under the mulch, will greatly assist the plants. This should be mixed with dry earth, very lightly scattered, and worked into the soil at a distance of about 18 inches from the stem. It must be remembered that this is the most stimulating of all animal manures, and must be used cautiously, or harm will result. Three cwt. of Peruvian guano is considered equal to 20 tons of stable manure. After applying the manure, a thorough watering is necessary. Dahlias planted late in December, to bloom during March and April, should be mulched about the end of January. If intended for exhibition, the plants should be pinched and induced to produce about six or eight strong shoots, which should be securely tied to a stake as growth advances, and kept well supplied with water. The soil should be lightly stirred occasionally.

Chrysanthemums, grown for exhibition, should not be allowed to receive any check during this period of their growth. The "break" or run of growth now being produced will provide the "crown" buds during February, from which the finest blooms develop. The character and value of the flowers depend altogether on these growths and their condition. They should be securely (*not tightly*) tied to stakes, and kept growing steadily. The beds should be occasionally hoed lightly, and sucker growths removed, and sufficient water applied during dry hot weather to keep plants from flagging. No feeding with liquid manure should be attempted in the open ground at this juncture. Plants grown in pots require such feeding as soon as their roots reach the sides of the pots, but it should be applied very weak at first. When Cannas have flowered, the old flower shoots should be entirely cut away. A top dressing of manure, and a thorough watering will assist in the production of a number of new shoots that will bloom in late summer and autumn, when the weather is cooler and moister. Delphiniums should also be cut down after flowering. A fresh break into growth will occur in a few days, and a good flowering will follow in about six weeks.

Seeds of perennial plants may be sown. A position sheltered from rough winds should be selected, and the seeds sown in boxes or beds that can be easily shaded, if necessary, and thoroughly watered. Something in the way of the roller blinds, which may be seen at any nursery, is suitable for shading. The material may be hessian or calico. To get the best results, new fresh seed, and a fair amount of heat and moisture are necessary. January is the best time to sow seeds of pansy, Iceland poppy, and other plants for blooming during the winter.

Ground should now be prepared for the reception of spring-flowering bulbous plants, bulbs of which may be procured during the next three months. As previously advised, the soil should be well and deeply worked, and some well rotted manure incorporated.

Kitchen Garden.

The abundant rain at the beginning of last month should insure a fair supply of most vegetables during summer, where sufficient plants were raised to plant out, and advantage was taken of the favorable conditions for planting. Cabbage, celery, and other vegetables, once fairly established, endure a deal of heat and drought, if the soil is regularly stirred and moisture conserved.

Seeds of cabbage and cauliflower (early varieties) may be sown, and plantings made from former sowings, allowing fair room for the plants to develop. Seeds of kidney beans and early varieties ot peas should be sown in drills. The soil, if dry, should receive a gooc soaking before the seeds are sown. "Daisy" is a good early variety of pea, a very dwarf grower, and splendid cropper. Enough seed of turnip, early carrot, radish, and other vegetables should be sown to meet requirements. Tomato plants should be tied to stakes as they advance in growth, and all laterals removed from the selected shoot, or shoots, as they appear. Where heavy crops are set, abundant watering and mulching are necessary to assist the plants to properly mature the fruit.

Ground should be deeply worked and well manured for the reception of autumn crops. Early varieties of potatoes may be planted. In connexion with potatoes, it may be interesting to note that two of the varieties recently introduced by the Department of Agriculture, viz., "The Factor" and "Up-to-Date," are, in England, considered to be among the six best flavoured varieties. "Langworthy," another variety that has been imported, is also included, but is stated to be a light cropper.

ROSES.

C. French, F.L.S., F.E.S., Government Entomologist.

Notes for Beginners.

POSITION.

The most necessary of all conditions for rose growing are position, soil, and shelter. I allude to shelter without shade, that is, a hedge of some material which does not impoverish the soil, as privet, pittosporum, &c., which will afford the necessary shelter without too much shade. Where it is inconvenient to plant hedges, shelters made of tea-tree will answer as well as most things. For position, choose, if possible, a site facing the north-east, and at once commence the very important task of forming your rosary.

SOILS AND THEIR PREPARATION.

To use the words of the Rev. Mr. Dombrain, of rose-growing fame, the soil should be a rich unctuous loam, a loam which when pressed between the finger and thumb does not crumble, but kneads like a piece of putty; it must not be clay, although approaching it closely. Here is the experience of one of our oldest and best growers, and, as I have ofttimes tested it for myself, I can vouch for its accuracy, and the practical nature of the advice given. "In preparing the beds, we measured a space 4 feet for the first trench, all subsequent trenches being of the same width; this afforded plenty of space for getting sods, manure, &c., in evenly. The top spit, which consisted of good old fibrous turf, was then wheeled to the farther end of the bed, and kept separate on one side; also the next spit below, so as to be at hand for filling up the trench. The bottom spit was taken away as useless, leaving a trench 2 feet 6 inches deep. This was filled in the following manner:—At the bottom was placed a layer of yellow clay some inches deep, so as to retain moisture (the sub-soil being gravel), and on this a layer of small chalk (our marl would do). Thus about half the sods which constituted the first spit of the next trench were placed turf downward, and loosely broken up smaller. Then the first sods were covered with cow manure, and finally filled up with the second spit of the following trench." There are other ways of preparing land for roses, but the trenching and draining must be insisted upon. It is a long-standing and a popular error that roses will not do well in sand, and must have clay. This is a mistake, as some of the best stands of roses ever seen in the State were, in the early sixties, grown on a sand-hill with an exposed south-west aspect. I do not, of course, advocate sand for roses, but merely wish to show that roses will grow and thrive in sand, but blooms grown on sand lack the solidity and lasting qualities of those grown on heavier soils.

HOW AND WHEN TO PLANT.

Having selected your site and soil, you will now have to select your time for planting, and upon this subject there is a great diversity of opinion. In a normal season I prefer the end of May to remove and plant standards, and dwarfs from May till October. Pot-grown plants of both standards and dwarfs may, of course, be planted at any time. When a garden has to be made late on in the season, the pot-grown stuff is a decided advantage; if carefully planted they will hardly feel the shifting. In selecting standards, choose straight green and healthy-looking stems, with ripe and vigorous growth forming the heads of the plants in question. In planting a rosary, I prefer the half-standards, as they offer less resistance to the wind, and, as a rule, do better than the taller plants. In sheltered spots, and to take off the squat appearance of a group, the full standards may be used with advantage. In planting roses, see that the roots are well spread out, and trodden firmly in after planting. This will be especially necessary when planting full standards. Staking at once is the safest and best plan to be adopted, and in exposed places a warp of hayband is a good help in preventing the stems from being scorched by the sun. The question of roses grown on their own roots, *i.e.*, struck from cuttings and not worked, and those worked upon other stocks, has long been a much-debated question. For a bush garden, that is, where display alone is required, and but little

display of symmetry is practised. I certainly prefer the great majority being on their own roots, as they make bigger shrubs, and are, upon the whole, more hardy. When suckers appear they are those of the parent plant, and have not, as is the case of worked plants, to be removed. There are, of course, some kinds which do better when worked on a vigorous stock, but in so short an article as this the matter cannot be properly explained.

PRUNING.

As with fruit trees, there is no royal road to pruning, as different varieties often require different treatment. One good rule is, not to be afraid to trust an experienced hand with a pruning knife. The beginner would do well to take a lesson or two from some practical and well-known rose grower. There are some roses which will not grow unless cut hard back, while others do not thrive when so treated. It is a common error that rose-growing is difficult to learn. This is not so, and, strange as it may appear, it is easier to grow a rose by ordinary means than to kill it, excessive wet and absence of drainage being the two conditions fatal to rose culture.

SELECTION.

This is a wide field, and must be left largely to the man of experience, especially Australian experience, as roses which are in the first rank in Europe are not always so in Australia. There are a few rules which, as one of the pioneer rose growers of the State, I may commend to your consideration. First, deal from recognised firms of nurserymen; second, purchase the best stuff; and lastly, but not least, do not purchase at auction. These plants frequently have their labels knocked off by removal, and are often allowed to remain too long exposed to the sun and cutting winds. As to the varieties to plant, you cannot do better than consult the lists published from time to time by the National Rose Society of Victoria, and other publications issued in the State.

Insect Enemies of the Rose.

The rapid strides made during the past few years in the hybridization of the "Queen of Flowers," and the extraordinary prevalence of insect attack, renders it imperative that some practical means for dealing with the latter should be forthcoming. From a long experience I can with safety deal with the matter through the columns of the Victorian *Journal of Agriculture*. I have therefore given a short account of the life-history of the insects herein treated, with some suggestions as to the means to be adopted for prevention and eradication.

THRIPS.

The eggs of the Thrips are deposited upon plants of various kinds, the pupa being not unlike the insect when in its perfect state. It is marvellous with what rapidity these tiny insects increase, a part cause, according to the testimony of Dr. Howard, Chief of the Entomological Division of the United States Agricultural Department, being the presence of that singular character known as parthenogenesis. Thrips are a perfect terror to gardeners, especially when plants are out of doors. Fumigation and moisture when under glass render successful treatment easier than in the case of plants grown in the open.

When the spring buds make their appearance, keep the spray pump going. Use a weak nicotine mixture, also extract of quassia, pyrethrum, or anything else which would likely act as a deterrent. Once the thrips penetrate the buds, no matter how small the latter may be, the damage has commenced. When roses are badly attacked by thrips, all infested blooms and buds should be carefully removed and burnt, and a good spraying with nicotine should be at once given. If good autumn blooms be desired, cut the roses lightly back, and as the normal summer advances the thrips will disappear, and there will still be a chance of fairly good summer blooms. It is noticeable that during the last and present seasons especially, the tea and hybrid tea sections have been the worst sufferers, our favorites "Maman Cochet" and its relations having had a sorry time of it. The hybrid perpetuals, also some of the looser petalled kinds, as "Lady Battersea," "Liberty," "Grus au Teplitz," and others have, in most places at least, been practically free from attack.

Some writers recommend the use of a board on which honey, or some other sticky substance, has been placed. This is held over the plants affected, and the plants are then shaken, when clouds of the thrips fly upward, and are thus captured in enormous numbers. Unfortunately, the thrips are by no means confined to the rose, as they will tackle most plants, and are very destructive to early blooming apples, raspberries, &c. This tiny insect is also one of the very worst pests of the azalea grower. There are a large number of species, which are generally distributed throughout the habitable regions of the globe. When mulching, roses especially, use the best rotted manure, and not fresh stable dung.

ROSE APHIS (SIPHONOPHORA ROSÆ).

These are small green or reddish plant lice living on the stems and young leaves of the rose, which they puncture with their beaks, and extract the sap, thereby causing the leaves to shrivel, turn black, and finally injure the young buds of the plant. The wingless insects are mostly green in colour, but sometimes reddish. The winged lice are green, the head and thorax brown or black, the abdomen marked with black or brown. We all know of this troublesome pest of the rose-grower, and have, doubtless, had many a fight with it. There is but one practical way of dealing with the rose aphis, and that is to keep working away with your spray pump, never resting so long as any traces of the insects are visible. As to the remedies to be used, I wish to state that I am simply giving you the results of my own observations, so that I do not wish to discredit, or in any way belittle, what others have done, and are doing, towards the suppression of the aphis in question. Immediately after pruning, spray with a weak (1 in 15 or 20) kerosene emulsion. Later, when the buds are showing signs of breaking, again spray with a weak decoction of quassia chips. This renders, for a time, at least, the bark distasteful to the aphids about to puncture. When the shoots are becoming firm spray with either soaperine, nicotine, Garrick's emulsion, or Girhurst compound. (I prefer the emulsions and nicotine, which do not require washing off with water.) The price of success is constant vigilance, but it must be borne carefully in mind that the young foliage of all roses is most tender, and easily injured by strong applications, which, owing to the rapid increase of the insects in question, must, after all, be applied to the plants several times. Aphids are great disfigurers of the rose, and should be tackled by all lovers of our favorite flower.

(The conclusion of this article will appear in the February Number of the Journal.)

MODERN BEE FARMING.

R. Beuhne, President Victorian Apiarists' Association.

PART IV.—THE BEES.

There are several ways of stocking an apiary with bees. Which of these is adopted must depend upon the means of the intending apiarist, the degree of knowledge he possesses, and the circumstances of locality and season.

A SWARM OF ITALIAN BEES.

The easiest but most expensive way is to buy established colonies in hives of the pattern one intends to adopt. There are many badly kept hives all over the country, and it is usually such that are for sale. Although the hives and frames may be factory made, the combs are often badly built, joined together, or largely composed of drone comb. There is also the risk of disease in the combs. It is therefore best to obtain established colonies from some one who makes the sale of bees part of his business. The price for a colony of bees in a two-story hive, with

drawn or partly-drawn combs, ranges from £2 upwards, according to strength of the colony, time of year, and the law of supply and demand. Another way of starting is to buy three-frame nuclei, that is, three frames of comb, bees—queen and some stores—from a supply dealer or apiarist. The bees and frames are on arrival transferred to a single-story hive, combs, or frames with foundation, added to fill the box. The transit nucleus-box is usually returned to the supplier. These nuclei, if obtained in October or November, will, under favorable conditions of season, rapidly work up into good colonies. The price, governed by the same circumstances as in the case of colonies, is from 10s. upwards.

Bees may also be bought in common box hives and transferred to frame hives. There is in this, however, even greater risk of introducing foul brood than in the case of neglected frame hives. Years ago it was a common practice to transfer not only the bees, but also the larger amount of comb, with brood and stores. This was accomplished by cutting the straighter combs to fit into frames, temporarily securing them in position by means of string or small sticks, and giving them back to the bees in their new hive. It is at best a laborious and unsatisfactory work, and the resulting combs are not what are expected in a frame hive. Owing to the additional drawback of also occasionally transferring disease to the new hive, the practice has been largely abandoned in favour of another method, which transfers all the bees to the new hive, even those still in the larvæ stage, without transferring combs and carrying infection.

The method is easiest during the swarming season, but may with certain modification be carried out at any favorable time during bee activity. Having purchased a number of box hives, say, 20, in spring, place them on the exact spots where you wish your frame hives to stand later on. At the beginning of the swarming season, we will assume that 10 of the 20 are strong, that 5 are medium, and 5 weak. We will name them A, B, and C respectively. If one of the A swarms, secure the swarm in a common box, as much like the one the swarm came from as possible. When the swarm has calmed down somewhat (in half-an-hour to an hour), take the box it came from away, and stand it close alongside one of the C hives. Then bring the box with the swarm back to the place formerly occupied by its old home, facing in the same direction. During the day any field bees which remained in the box when the swarm issued, or were away foraging, will fly to their old locality, and thus join the swarm. About sunset on the following day the new bar-frame hive is put in place of the box hive; the swarm is dumped out on to a cloth or bag spread out in front of the entrance, and the bees allowed to run in. Provide plenty of ingress by raising the hive somewhat off the stand in front.

In the parent box from which the swarm issued, and which stands now alongside one of the C hives, all the worker bees will have hatched out 21 days after the swarm left. A young queen will begin to lay in from 16 to 20 days. Therefore, on the 22nd day, if the bees are drummed up into an empty box in the usual way as when box-hives are robbed, there will be nothing in the brood combs but eggs, some very young larvæ, and possibly a little unhatched drone brood. The combs may then be boiled down for wax, and the bees started in a frame hive. The C hive close alongside is drummed up at the same time and put into a frame hive. The box, with combs of brood, is carried away and put on

top of one of the B hives, through the top of which some 1-in. holes have been bored with a centre-bit to allow the bees to come up and take care of the brood. If pieces of queen-excluding zinc are placed over the holes, the queen is kept below, and in 21 days the bees may be drummed out of both boxes, put on frames, the top box combs boiled down, and the lower box, with the brood, carried away and put on top of a B or C hive. This may be repeated till there is but one box hive left, which, if it does not swarm, has to be treated as in robbing box hives.

We must here refer to the parent stock of the first swarm, and the C hive it was placed alongside of, each of which is now in frames and close alongside each other. A few days after it is transferred the C hive should be looked through for the queen, which is to be destroyed. At dusk the same, or the following day, both hives are shifted aside. One hive is placed exactly on the centre line where the two stood, and in it are placed the combs and bees from both, alternating them and blowing smoke between all the time. The remaining hive body is put on top as a second story, if required. We have now a normal colony, with a good young queen.

In seasons when there is not enough swarming, or after the swarming season, one-half of the box hives to be transferred may be drummed out and put in frame hives at once. Put the boxes of brood on the remaining ones. In three weeks this may be repeated. It should, however, be borne in mind that transferring should not be done unless the weather is warm, and there is a fair income of honey; also that a weak colony cannot take care of the brood from a strong one, but a weak one may manage the brood of a medium, and a medium that from a strong one. This holds good also in regard to bees in frames; any strengthening of the weaker colonies by means of combs of brood from the stronger should be done gradually, otherwise much of the brood transferred will be wasted, although this will only be noticed by a careful observer.

There is yet another way of obtaining bees, namely, by live weight—that is, purchasing the bees at so much a pound, 2s. 6d. a pound being about an average price in spring. A swarm of black bees will weigh from 3 to 6 pounds. Swarms of hybrids and Italian are often much larger, up to 12 pounds being known. The swarm in the accompanying illustration, after being hived, was weighed, and gave a net weight of bees of 10½ pounds. If swarms are sent any distance there is considerable risk of loss from overheating, unless the transit boxes are of sufficient size and properly constructed. For a 4-pound swarm the box should be about the size of a kerosene case, with a frame of 1in. by ⅜in. wood, covered on the inside with fine wire screen at each end in place of the end boards of the case, so that no matter in what position the box stands there is always thorough ventilation. The projecting upper and lower cross-pieces of the ends prevent close fitting up against any flat surface during transit. The inside of the box should be rough, as the bees cannot retain their foothold on planed boards, in case of jars and knocks in transit. If sent by rail mark the boxes, "Keep in the shade and well aired." On arrival at the apiary, the boxes are best kept in a cool, draughty place, and the bees run into their hives about sunset, otherwise there may be much confusion and some swarming out; whereas, if released in the evening, the bees will have calmed down, and will locate their new surroundings as they commence to fly.